Volume IV: Case Studies

1. Case Study I

1.1 Outline of Case Study 1 (Recyclables Collection)

The outline of the Case study 1 is summarized in the table below.

Table 1.1.1 Outline of Case Study 1

Title of the Study	Recyclables Collection Case Study
Study Period	6 months (July to December 2007)
Study Area	?á Residential area: Gawad Kalinga Pinagsama Villages (Western Bicutan, Taguig), Bgy. UP Campus (Quezon City) ?á Office building: Benpres Building (Bgy. San Antonio, Pasig City), Commission on Human Rights (Bgy. UP Campus, Quezon City) ?á Commercial establishment: SM City Sta. Mesa Food Court (Bgy. Santol, Quezon City) ?á School: New Era High School (Bgy. New Era, Quezon City)
Target stakeholders	Awareness raising: communities, business establishments (private / public), and schools Collection/recycling: collection/transportation agents, dealers, and industries utilizing recyclable materials
Target recyclables	Paper, Plastics (general types of plastics), Metals (aluminum and tin cans), Glass
Purpose of the Case Studies	?á Analysis on the impact/result of the proper segregation practice among the target parties through awareness raising activities using the materials developed under the study. ?á Review and assess the possibility of developing 'segregation at source/ collection/ recycling system' in urban areas
Main activities	(1) Identification of actual recyclable collection practices in the study areas Identify amount of collected recyclables, which will be used as the base line data in the study areas, through actual measurement. (2) Development of educational / publicity materials for awareness raising Develop "educational / publicity materials" to promote proper segregation of recyclable materials for target communities, business establishments, and schools. (3) Conduct of awareness raising activities using the educational/publicity materials developed By using the educational / publicity materials developed, carry out awareness raising activities for 'proper segregation' for communities, business establishments, and schools in the study areas. (4) Development of a recyclables collection plan based upon 'waste segregation at source" in the study areas. Develop and review the recyclables collection plan, and determine the 'methods of waste segregation at source', 'collection methods', and 'recycling methods or finding final user of the material'.

	(5) Implementation of the recyclables collection plan Based upon the recyclables collection plan developed, carry out recyclables materials collection. Record the cost and/or volume of collection/ transportation/ processing. Data will be used for analysis / evaluation of possibility of development of the recycling system. Duration of this activity will be 1 to 3 months. (6) Analysis and evaluation of the recyclables collection activity Based on the data collected, compare and evaluate the waste segregation practices or recyclable materials collected among/from the target entities before and after the awareness raising activities. Furthermore, analyze and evaluate the conditions, issues, and/or economic feasibility of the recycling system.
Expected Outcomes	?á Proper waste segregation at source will be promoted through awareness raising ?á Conditions and feasibility of recycling system development in urban area will be identified.
Other information	When implementing the case study, cooperation from industrial associations that include TWG members in each recyclable material type, as well as barangays and LGUs.

1.2 Recyclables Collection in Gawad Kalinga Pinagsama

1.2.1 Current conditions and issues

(1) Site profile

Gawad Kalinga (hereinafter referred to as GK) is the NPO whose mission is to provide dignity and peace for every Filipino through providing land for the landless, homes for the homeless, and food for the hungry. GK has been coordinating the development of Pinagsama Villages; beneficiaries (those who are going to move in the new houses constructed by the GK projects) and volunteers have been engaged in the construction work for the village development. Residents of the GK Pinagsama Village are expected to move in the new houses from the middle of August 2007. Residents of the GK Pinagsama Village are considered as low-income households, and their surrounding area is resided by middle-income households. The site profile is summarized in Table 1.2.1, and some pictures representing the site are shown below.

Table 1.2.1 Profile of Gawad Kalinga Pinagsama

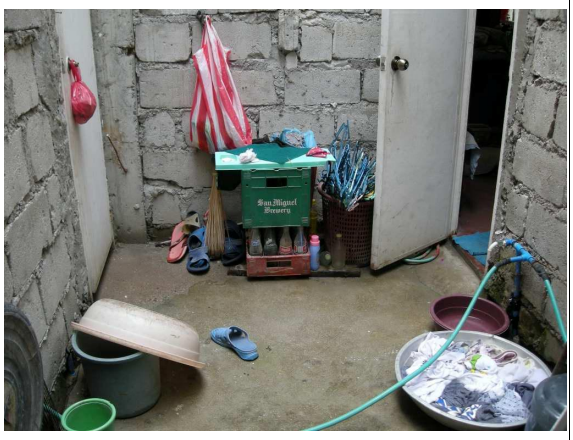
Location	Western Bicutan, Taguig
Size	58 households distributed in two adjacent villages (Poveda and Fuji Xerox, named after the sponsors)
Community organization	GK Pinagsama caretaker is assigned.
Reasons for being selected as case study site	• Community organization is present (easy to organize activities) • It is highly replicable for other GK sites • Manageable size • Families are just starting to move in (no existing waste segregation / recyclables collection system) • Low-income area (the other site for residential areas is classified as middle-income)



Construction of the Housing



Planned Area for Composting



(Storage Space for Recyclables)

Common Space for Four Households



Planned Area for Recyclable Storage Facility

	
Typical house in which a prospective resident is currently living	River next to the site (covered with plastic bags)

(2) Waste Management Practices

Waste management practices in the GK Pinagsama Village as of August 2007 are summarized in Table 1.2.2.

Table 1.2.2 Waste Management in GK Pinagsama Village before the Case Study

Recyclables Volume/Characteristics	• Prospective residents may generate tin cans and glass bottles (but not PET bottles). • Volunteers or visitors bring in a lot of PET bottles
Solid Waste Management	• The municipal government collects household wastes irregularly. • Since squatters do not use trashcans, they put garbage in a plastic bag and tend to throw it into the nearby river, which is consequently filled with plastic bags (see the picture above). • There is no existing MRF in the village, but one composting area and a small recyclable storage facility (RSF) are to be established. • There is no internal system for recyclables collection (because residents have just moved in), but each of four households (one unit) is expected to take turns weekly to bring their recyclables to the RSF to be established in the village.

1.2.2 Needs Assessment

The needs of GK Pinagsama Village in the field of solid waste management were identified at the focus group discussions as follows:

a. GK leaders mainly just want to have a livable environment free of litter

b. GK leaders admit that their knowledge on waste segregation is limited, and that it is not yet a standard practice in their villages

c. They want a program that is easily replicable, is aesthetically pleasing, and promotes values such as cooperation with one's neighbors, etc.

d. They wish to have centralized collection and selling of recyclables that the community would be able to benefit from

e. They want assistance in establishing their composting facility

f. As for the garbage in the creek beside the villages, they do not see this as something they could address because they identify that the source of the solid waste is from upstream sources. They say that none of their members throw garbage in the creek anymore.

1.2.3 Recyclables Collection Plan

(1) Expected Outcomes and Activities

Based on the above needs assessment, expected outcomes and corresponding activities are planned as in the following table.

Table 1.2.3 Expected Outcomes and Activities in GK Pinagsama Village

Expected Outcome	Activity
The GK Pinagsama residents are conducting waste segregation at a household level	• Provide the residents with one waste segregation frame including a pail for food wastes and hooks for bags to contain dry wastes (recyclables and residuals) per 4 housing units • Provide the residents with a poster indicating proper waste segregation per 4 housing units, integrated in the frame • Give the residents instructions on proper waste management • Provide the residents with a handbook on solid waste management (management of recyclables)
The GK Pinagsama Village has a facility to store segregated recyclables at a community level	• Confirm the construction of a recyclable storage facility (RSF) with the GK caretakers • Provide the GK Pinagsama Village with a weighing scale and cabinets for waste paper storage • Put posters reminding the residents of places for each type of recyclables in RSF

Wastes in GK Pinagsama will be handled as follows:

Table 1.2.4 Ways to Handle Wastes at GK Pinagsama Village by Waste Type

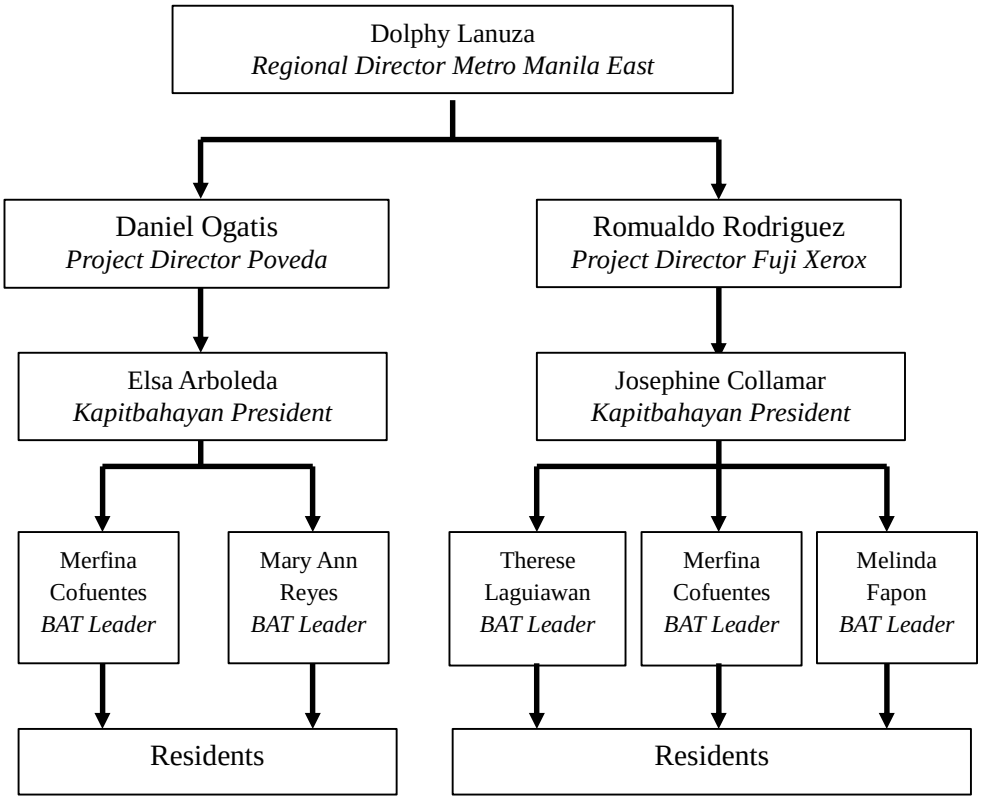
Type of Solid Waste	Kitchen Waste	Biodegradable Waste (leaves, plants)	Recyclables	Residuals
Intermediate Container	Compostables container in common area	-	-	Residuals container in common area
Person Responsible for placing waste in correct container	Assigned collector	Household	Household	Assigned Collector

Type of Solid Waste	Kitchen Waste	Biodegradable Waste (leaves, plants)	Recyclables	Residuals
Schedule of Intermediate Collection	Daily; and immediately as needed	Immediately as needed	Immediately as needed	Daily; and immediately as needed
End Destination of Solid Waste	Compost pit near creek	Compost pit near creek	Recyclables storage area	Municipal residuals waste truck; future proposed community residual bin (locked)
Person Responsible for Transfer of Waste to End Destination	Assigned collector	Household	Household	Assigned collector
Schedule of End Collection	Daily	Daily	To be coordinated with GK administration for selling to junkshop	Upon arrival of Municipal Truck

(2) Structure for implementation

The solid waste management committee, which is based on the existing Gawad Kalinga Kapitbahayan or the neighborhood association, implements the segregation/collection of recyclables. The solid waste management committee has the structure as shown in Figure 1.2.1. The Regional Director and the Project Director, also known as Care-takers, are members of Couples for Christ, while the Kapitbahayan President and the Bayanihan Action Team (BAT) are from the beneficiaries or residents. The Regional Director will serve as the Solid Waste Management Committee Head. The Project Directors will be the coordinators of each of the villages, and they will be assisted by their respective Kapitbahayan Presidents. The BAT leaders will be the coordinator to the residents; each BAT handles 5-7 households.

The set-up of the houses of the GK Pinagsama Village is that four houses or a cluster share a common area which is use for laundry. The segregation bins will be place within the common areas. As participation for the residents, an “Assigned Collector” will be selected every week and will be responsible for the segregation bins. The assignment will be in rotation so that each household will participate. The Aviary / RSF Caretaker will also be in rotation and shall be in-charge of the Aviary and Recyclables Storage Facility.



Note: BAT: Bayanihan (Cooperation) Action Team

Poveda and Fuji Xerox: Sponsors to GK Pinagsama

Figure 1.2.1 Implementation Structure in GK Pinagsama Village

1.2.4 Achievement

(1) Implementation Schedule

The abovementioned activities were implemented by the following schedule.

Table 1.2.5 Activity Schedule in GK Pinagsama Village

Week	Activities
23-29 Sep. 2007	• Finish Solid Waste Management and Collection Plan proposals, and discuss with key persons for approval • Finished construction of Recyclables Storage Facility
30 Sep.-14 Oct. 2007	• Design, procurement and preparation of IEC materials and infrastructure
Nov. 3, 2007	• Delivery of cabinets for RSF
21-27 Oct. 2007	• Approval of a prototype waste segregation bins
Nov. 5, 2007	• Training of residents regarding proper waste segregation via segregation activity (game) during the launching • Installation of waste segregation frames and posters • House to house visits • Implementation of Solid Waste Management and Collection Plan in GK Pinagsama Village • Start of monitoring.
05-17 Nov. 2007 until the end of December	• Monitoring; • Documentation

(2) IEC Materials and Equipment Distributed

The IEC materials and equipment distributed are summarized in Table 1.2.6.

Table 1.2.6 IEC materials and Equipment Distributed in GK Pinagsama Village

Area	Container / IEC Material	No. of Units	Notes
Common area of the cluster (4 housing units)	Waste segregation frame	20	Includes a kitchen waste pail and hooks for garbage bags, recyclables net bag
	Poster on waste segregation	20	Part of the waste segregation frame
Recyclables Storage Facility (located at Poveda Village)	Paper cabinet (paper, newspaper, cartons)	2	One shelf per village
	Sacks (for other recyclables)	7	
	Weighing Scale	1	
Poveda and Fuji Xerox Village offices	Program poster	2	

(3) Outcomes

All the residents have moved into the new houses by the end of November 2007. Each of the four units has been provided with a segregation frame with a pale for food waste and hooks for bags (see the picture “Waste Segregation Frame with Poster” below). The community has established a recyclable storage facility (RSF) in their premises, and each household takes turn to transferring the recyclables from the unit courtyard to the RSF every week. Although there is a plan to compost organic wastes generated from the residents in the community, and the composting box has already been constructed, they are still waiting for starting materials such as good garden soil to be sourced elsewhere. The organic waste has not been collected for composting but disposed separately from residual waste for municipal waste collection.



Completed Housing



Completed Housing

<table>
<tr><td></td><td>
</td></tr>
<tr><td>Focus Group Discussion</td><td>Recyclables Storage Facility</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Waste Segregation Frame with Poster</td><td>Composting Box under Construction</td></tr>
<tr><td></td><td>
Cans, Bottles, Plastic cups


Plastic film</td></tr>
<tr><td>Posters and Cabinets in RSF</td><td>Recyclables Collection Bags in the RSF</td></tr>
</table>

The following Table shows the breakdown of the various types of recyclables that the GK community sold. These covered a period of 4 months and were sold thrice to the junkshop located

beside the creek. However most of the recyclables are still in the MRF and have yet to be weighed, waiting for bulk selling. Some residents were also observed to sell their recyclables directly to the junkshop which is not part of the GK policy but some BAT leaders allow it since they know that some households are in dire need of added income. Note that the prices of the junkshop sometimes varied throughout the course of the 4-month period.

Table 1.2.7 Volume and Value of Recyclables Collected at GK Pinagsama Village during the Case Study (in 4 months)

Item	Weight (kg)	Unit Price (PhP/ kg)	Value (PhP)
Cartons	32.75	3-4	32.00
PET	8	21.25	170.00
HDPE "Sibak"	3.75	16.00	216.80
Tin cans	11	3-4	42.00
Bottles (lump)	143	-	158.00
Shards "bubog"	10.75	-	6.34

1.3 Recyclables Collection in UP Bliss

1.3.1 Current conditions and issues

(1) Site profile

UP Bliss is one of the housings for those who work at the University of the Philippines. UP Bliss is composed of 11 residential buildings, and one of them is selected as the case study site. Each building has one janitor who collects household waste every day. The site profile is summarized in Table 1.3.1, and some pictures representing the site are shown below.

Table 1.3.1 Profile of UP Bliss

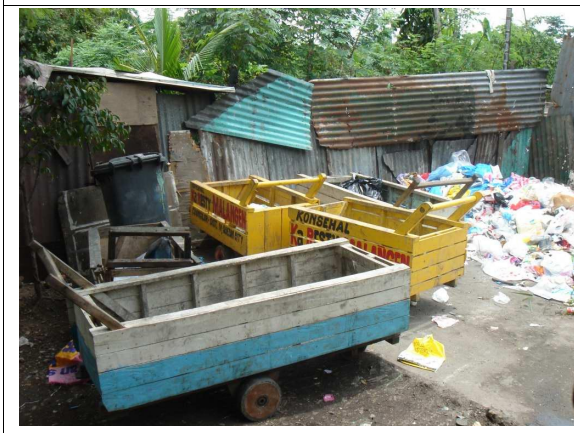
Location	Building 8, Pook Sikatuna BLISS, Brgy. UP Campus, Quezon City
Size	11 housing complexes (32 households in four floors per one building)
Community Organization	• There are two Pooks (community unit under Barangay) in Brgy. UP Campus. One is Sikatuna Bliss (middle-income area) in which the case study site is located, and the other is Libis (low-income area), in which Pook level MRF is located.
Reasons for being selected as case study site	• Since one of the targeted residential areas is low-income (GK Pinagsama), middle-income target site was appropriate. • Among the 11 residential buildings, the janitor at the targeted building is the only one who recovers recyclables. • Building 8 is where the Barangay Coordinator for UP Bliss was residing and it was recommended for ease of coordination. • Manageable size, volume and area • The experiences in this site can be replicated in other Buildings of the Sikatuna BLISS apartment-type housing



UP BLISS Housing Complex



Waste Cart on the Hallway



Carts Used for Waste Collection



Sorted Recyclables at BLISS MRF



Pile of un-recyclable Waste at BLISS MRF



Segregated Recyclables at Barangay MRF

(2) Waste Management Practices

Waste management practices in the UP Bliss as of August 2007 are summarized in Table 1.3.2.

Table 1.3.2 Waste Management Practices in UP Bliss before the Case Study

Recyclables Volume/Characteristics	• Residents generate paper, PET bottles, aluminum cans and glass bottles. • All the recyclables are mixed with biodegradable wastes and other garbage in plastic bags. • Roughly 2-3 small plastic bags per unit per day or one "kariton (waste push cart)" per day
Solid Waste Management	• There is one waste bin (cart) at the hallway on each floor brought by the eco-aide. Residents throw their garbage into the waste bin or the eco-aide goes up the floors to get their garbage. The collector moves the waste bin to Libis MRF (Pook level MRF) every day. • Each household pays PHP40 of waste collection fee every month. Half of the fee is paid to a collector, and the rest goes to livelihood program of the people's organization (SKPK) to which they are members of; therefore, residents in UP Bliss think that it is the collector that should segregate their wastes. • The collector receives about PHP 1,200 for waste collection every month. In addition, the collector of Building 8 earns about PHP4,000 to 5,000 per month for selling recyclables he (she) recovers from the waste bin and other parts of the premises. This is not necessarily the case for the other collectors. • There are two MRFs in Brgy UP Campus; one is MRF Libis (Managed by the People's Organization), and the other is the Village A MRF (managed by the Barangay). About three people are working at the Libis MRF as sorters, and five people at the Village A MRF. The workers at the MRFs are paid by the Barangay. • The Libis MRF sells their recyclables to the Brgy level MRF. Proceeds from the selling are divided in half; the amount collected from the recyclables is not based on the weight but by estimation by visual observation (because there is no prior weighing of Pook MRF recyclables to distinguish from the larger MRF).

1.3.2 Needs Assessment

The needs of UP Bliss in the field of solid waste management were identified at the focus group discussions as follows:

Stakeholder	Needs
Barangay	• Bgy. Captain wants to end the formation of a dumpsite within the Libis MRF compound • The Libis MRF only accommodates solid waste from UP BLISS and not from junkshops or the Libis community • Segregation at the household level
People's Organization (Sagisag ng Kaalaman Para sa Kaunlaran, or SKPK) who manages the Libis MRF and ecoaides	• The Libis MRF should be self-reliant in terms of management and recyclables trade • Eco-aides are to continue their collection from the BLISS residents with the same collection fee as before • Proceeds from recyclables selling be allotted partly for maintenance of the Libis MRF aside from going to the 2 personnel who sort the recyclables according to type • Education regarding the laws on solid waste management • Organizational strengthening (formalization, IDs, guidelines)

Stakeholder	Needs
	• Equipment and safety materials • Assistance in talking to the BLISS residents to segregate biodegradable vs non-biodegradable (some have mixed feelings re segregation according to biodegradable vs. recyclable vs. residual because they feel that the recyclables will already be sold by individuals from BLISS and thereby lessen their source of livelihood)
Quezon City Environment Protection Waste Management Department	• Segregation at the household level according to biodegradable, recyclable and residuals • Residuals to only be collected on Tuesdays and Fridays, and will be given directly to the trucks • No accumulation of residuals for more than 24 hours
BLISS Residents	• As long as their garbage is collected everyday they have no major concern • Do not want to segregate because they pay collection fees

After the FGDs were conducted, the Barangay Captain requested the deployment of trucks from the QC EPWMD to haul the mounting garbage pile at the Libis MRF. Collection was to be temporarily handled directly by the barangay, while collection by the eco-aides would cease momentarily while a new collection plan is to be drafted. These actions were done independently by the Barangay in their prerogative and capacity as the local government unit head, and did not involve the case study team. While this addressed the problem of the garbage heap in the Libis MRF, there were many misinterpretations brought about by this action. These events occurred a month before the scheduled barangay elections in late October 2007, and were used by political rivals to campaign against the incumbent barangay captain. Conflicts arouse between the councilor currently handling the Solid Waste Management Committee, the Barangay Coordinator for UP BLISS, the BLISS homeowners' association, and the SKPK. The eco-aides interpreted it as an immediate threat to their livelihood, because rumors have spread that the Libis MRF operations will be stopped permanently. Because of these events, the case study team reassessed their strategy for the area and focused on conflict resolution first between the barangay and the SKPK/ Libis MRF eco-aides. The interventions now focused on organizational strengthening of the eco-aides and equipping SKPK more knowledge and skills on waste management. This was done by the case study team together with the QC EPWD. Dialogues and IEC activities at the mid-income housing of UP Sikatuna BLISS were then put on hold until after the elections and designation of possibly a new SWMC head from the new barangay council.

1.3.3 Recyclables Collection Plan

(1) Expected Outcomes and Activities

Based on the above needs assessment, expected outcomes and corresponding activities are planned as in the following table.

Table 1.3.3 Expected Outcomes and Activities in UP BLISS

Expected Outcome	Activity
The eco-aides (waste collectors) are conducting safe waste collection and segregation	• Prepare a handbook on solid waste management and health and safety risk • Train the eco-aides on safe and proper waste collection and segregation with the above handbook • Provide the eco-aides with gloves and aprons
The Libis MRF keeps recyclables at good condition and records of recyclables sold	• Provide the Libis MRF with a weighing scale, a blackboard, and a storage crate for recyclables • Train the representative of the people's organization to keep records
A system to monitor waste segregation at source (household level) is established	• Educate the eco-aides on the importance of waste segregation at source • Authorize the eco-aides as a personnel to inform the UP BLISS residents of proper waste segregation • Formalize the eco-aide organization by formulating Guiding Rules & Regulations

Wastes in UP Bliss will be handled as follows:

Table 1.3.4 Ways to Handle Wastes in UP Bliss

Type of Solid Waste	Kitchen Waste	Biodegradable Waste (leaves, plants)	Recyclables	Residuals
Intermediate Container	Compostables container in kitchen area per household	-	-	
Person Responsible for placing waste in correct container	Household	Household	Household	Household
Schedule of Intermediate Collection	Daily; and immediately as needed	Daily	Daily	Tuesdays and Fridays only
End Destination of Solid Waste	Pig Dealers/ Compost pit at Barangay Village A MRF	Pig Dealers/ Compost pit at Libis or Barangay Village A MRF	Recyclables storage area at Libis MRF	QCEPWMD Truck To the Dumpsite
Person Responsible for Transfer of Waste to End Destination	ECO AID	ECO AID	ECO AID	ECO AID
Schedule of End Collection	Daily	Daily	Libis MRF will sell directly to accredited junkshop after sorting and weighing	Tuesdays and Fridays

(2) Structure for implementation

The Organizational Chart for Implementation of Solid Waste Segregation and Collection Scheme is shown Figure 1.3.1, wherein the Barangay Captain shall be the head of the organization. Various stakeholders involved in solid waste management shall be represented. These include the Kagawad for Solid Waste Management, Libis MRF Management, ECO AID Representative, Bliss Coordinator and the Representative from the Quezon City Environmental Protection and Waste Management Department.

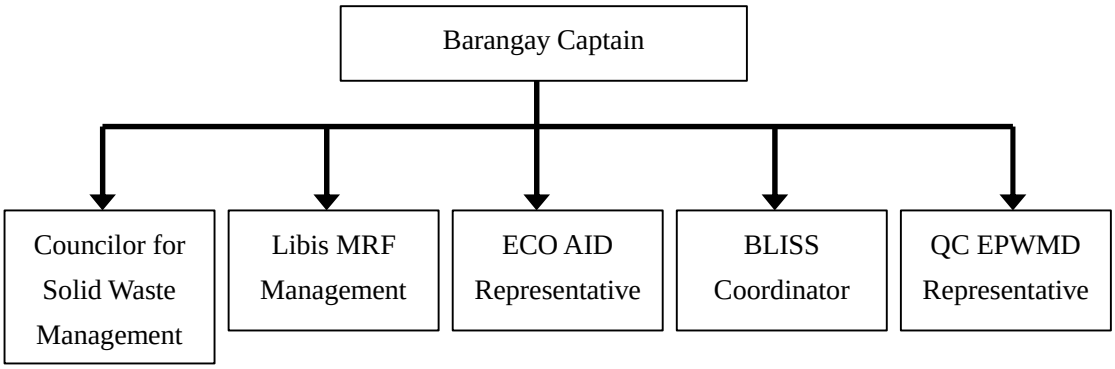


Figure 1.3.1 Implementation Structure in UP Bliss

1.3.4 Achievement

(1) Implementation Schedule

The abovementioned activities were implemented as in the schedule below.

Table 1.3.5 Activity Schedule in UP Bliss

Week	Activities
23-29 Sep. 2007	• Dialogues, conflict resolution and negotiations between Barangay Officials, Libis MRF, and QC EPWMD
30 Sep.-14 Oct. 2007	
14-20 Oct. 2007	
21-27Oct2007	
28 Oct.- 3Nov. 2007 ***(Barangay Elections)***	• Design, procurement and preparation of IEC materials
4-10 Nov. 2007	• Organizational strengthening, rules and regulations formalization • Start of monitoring of recyclables sold
11-17 Nov. 2007	• Finalize Solid Waste Management and Recyclables Collection Plan and Eco-aide Rules and Regulations, and discuss with new barangay officials and QC EPWMD • Dialogues with UP Sikatuna BLISS Management
18-24 Nov. 2007	• Creation of logo, picture taking for IDs • Painting of pushcarts • Capacity training of Libis MRF eco-aides regarding proper recyclables sorting, weighing, safety
25 Nov.- 1 Dec. 2007	• Deployment of materials, safety gloves, weighing scale, blackboard
02-09 December 2007	• Deployment of food waste pails
Dec. 16, 2007	• Organization Christmas Party and year-end meeting • Recycling Video Film Showing

Week	Activities
	• Distribution of IDs • Meeting with UP BLISS Building Coordinators and Barangay representatives
06-12 January	• Deployment of aprons with SKPK logo

(2) IEC Materials and Equipment Distributed

The IEC materials and equipment distributed in UP Bliss are summarized in Table 1.3.6.

Table 1.3.6 IEC Materials and Equipment Distributed in UP Bliss

Area	Container / IEC Material	No. of Units	Notes
Per Sikatuna BLISS Building	Kitchen waste pail	11 (1per eco-aid)	With eco-aid in their collection cart
	Poster on household wastes	11	To be posted in common area
Libis MRF	Storage crates	2	
	Black board for accounting, signing out of pushcarts	1	Libis MRF Eco-aides and sorters
	Weighing scale	1	
	Calculator	1	
	Paint and paint brushes for pushcarts		
	Template for accounting		
Eco-aides and sorter	IDs for Eco-aides	11 pieces	
	Aprons	11 pieces	
	Rubber Gloves	13 pairs	
	Rubber Boots	2 pairs	

(3) Outcomes

The eco-aides started using gloves and aprons for waste collection. The Libis MRF started keeping records (weight and price by type) of recyclables sold. All the eco-aides have been given the ID authorized by the Barangay Captain as personnel to monitor waste segregation at segregation level. Although it is not a part of the case study activities, the Barangay to which the UP BLISS belongs has also started awareness raising activity for the promotion of waste segregation and recycling at household level (see the picture “Awareness Raising Team “below).



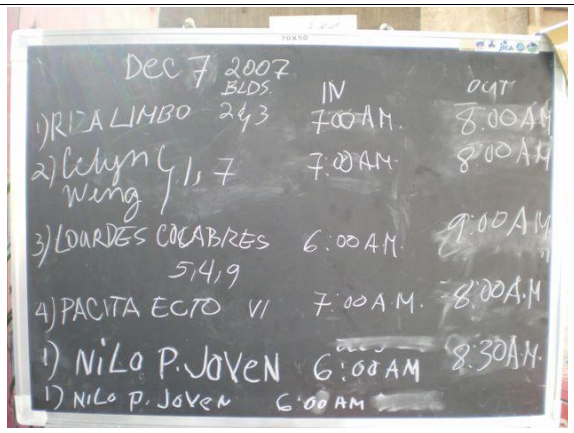
Focus Group Discussion



Focus Group Discussion



Storage for Recyclables



Blackboard for Communication and Recording



Segregation of Recyclables at Libis MRF



Bin for Food Waste



Composting Area for Garden Waste



Improved Storage for Un-recyclable Waste



Waste Segregation/Recycling Awareness Raising Team



Person Calling for the Community to Segregate and Recycle Wastes (with Message)

The following table shows the volume and price of recyclables collected at Libis MRF and Barangay MRF before the case study.

Table 1.3.7 Volume and Price of Recyclables Collected at UP BLISS before the Case Study

Recyclable	At Libis MRF	
	Volume* (monthly collection)	Value**
White Paper	1 sack	6.00/ kg
Newspaper/ Colored	12 sacks	0.50 – 2.00/ kg
Cartons		
Assorted waste paper	1 sack	
Plastic PET	4 sacks	18 (dirty), 20 (clean)/ kg
Plastic hard	3 sacks	12/ kg
Aluminum Cans		
Tin Cans	10 sacks	3/kg
Glass		0.50 – 3/ piece

* All recyclables gathered at Libis MRF given to larger MRF to sell; no weights measured.

** Prices based on personal knowledge of segregator

The Libis MRF was able to sell their recyclables roughly every 3-4 weeks. All transactions were properly documented, and the data are based on actual selling prices of the junkshops they have done business with. The following table shows the breakdown of the different types of recyclables collected by the Libis MRF.

Table 1.3.8 Volume and Price of Recyclables Collected at Libis MRF during the Case Study

Item	Weight (kg)	Unit Price (PhP/ kg)	Revenue (PhP)	Daily Ave. (kg/day)
White paper	89.5	8.00	694.00	0.79
Newspaper	65.5	5.00	327.50	0.57
Cartons	423	4.00	1,692.00	3.71
Assorted paper	760	1.00	777.00	6.67
PET	56	18.00	1,008.00	0.49
HDPE "Sibak"	138.5	15.00	2,077.50	1.21
Plastic cups	77.5	10.00	775.00	0.68
Aluminum cans	5	55.00	275.00	0.04
Tin cans	462.5	5.00	2,312.50	4.06
Bottles (lump) - assorted pcs	342		142.40	
Shards	161	0.50	80.50	

1.4 Recyclables Collection in Benpres Building

1.4.1 Current conditions and issues

(1) Site profile

Benpres Building is an office building whose tenants are related to Lopez Group including a TV network and a power company. Some companies have their own canteens while there is a common canteen on the 5th floor for the employees who work for the companies that do not have a canteen. The site profile is summarized in Table 1.4.1, and some pictures representing the site are shown below.

Table 1.4.1 Profile of Benpres Building

Location	Bgy. San Antonio, Pasig City
Size	700 employees 1 building, 6 floors (18,000 sq.m.), 22 offices
Management organization	Administration office of Benpres Building is in charge of waste management in the building. Each office (tenant) has one janitor, and there are several janitors not associated with office (clean up common areas)
Reasons for being selected as case study site	• The management of the Benpres Building is very supportive of the case study. • Manageable size, volume and area

	
Overview of the Building	Waste Bin for Segregation
	
Recyclables Sold to Junkshop	Recyclables Stored at Junkshop
	
Bin for Recyclables at Canteen Kitchen	Inside the Bin for Recyclables

(2) Waste Management Practices

Waste management practices in Benpres Building as of August 2007 are summarized as follows:

Table 1.4.2 Waste Management in Benpres Building before the Case Study

Recyclables Volume/Characteristics	• Significant volume of used paper and some PET bottles and aluminum cans are generated. • Recyclables are mixed with food residues in the offices.
Solid Waste Management	• The building does not have a solid waste management plan. • Janitors recover recyclables from waste bins in the offices, store the recyclables in their storage for clean up tools, and sell them to a junkshop who comes to the building every week. The storage is too small to conduct sorting of recyclables. • Some offices order their janitors to store recyclables in the basement storage of their office, and profits from selling the recyclables go to the office administration. • There is a communal canteen on the 5th floor. The canteen workers sometimes take food waste back home for their pets. Hard plastics, PET bottles, and aluminum cans generated in the canteen are segregated in the kitchen and sold to a junkshop by the canteen workers. • There is a large waste bin separated into three cells with different color lids (blue, yellow and red). This waste bin was originally established for segregating recyclables, biodegradable, and non-biodegradable, but it has not been utilized yet (wastes are all mixed). This is partly because the city garbage truck does not have separate rooms for segregated wastes. • Some offices already have their own waste segregation schemes; however, this is not uniformly implemented in all the offices. • Many of the offices do not have waste bins for segregation (wet and dry wastes are all mixed).

1.4.2 Needs Assessment

The needs of Benpres Building were identified at the focus group discussions as follows. Major issue at Benpres Building is to improve processing of recyclables especially paper waste.

a. Building administration wants a centralized and daily collection/storage of the food-contact recyclables to reduce pestilence

b. Administration also wants safer storage of paper recyclables to reduce fire risk

c. Janitors also wish to have better segregation by office employees to reduce efforts in segregation after collection from waste bins

1.4.3 Recyclables Collection Plan

(1) Expected Outcomes and Activities

Based on the above needs assessment, expected outcomes and corresponding activities are planned as in the following table.

Table 1.4.3 Expected Outcomes and Activities in Benpres Building

Expected Outcome	Activity
Recyclables are recovered from waste bins with higher quality (not contacted with food waste)	• Issue a policy to promote waste segregation at the tenant offices from the Benpres Building Administration • Put posters calling for waste segregation at offices
Food leftovers are segregated from recyclables and residuals at offices pantries.	• Same as above • Provide office pantries with waste segregation bins
Recyclables are collected and brought daily to common storage areas	• Hold meetings with janitors for the change of the recyclables collection and storage practices • Activate the use of existing waste segregation bin in the parking lot (for cans, plastic and glass bottles) • Establish a storage for waste paper at the basement • For proper accounting of the "ownership" of these recyclables, a representative of the junkshop would be there daily to weigh record and monitor proper sorting of said recyclables

(2) Structure for implementation

Within Benpres Building, the Benpres Building Administrator coordinates activities under the case study with relevant stakeholders. Benpres Building Coordinating Committee (BBCC), which is an existing organization of Benpres Building composed of representatives from different offices and convenes on a monthly basis, coordinates with tenant offices. Southbend Janitorial Services dispatch janitors to the tenant offices and coordinates with the junkshop. The cafeteria concessionaires have their own contract with other junkshop for selling recyclables. Pasig CENRO/SWMO is in charge of collection and treatment of household wastes and contracts out the management to Ortigas Center Association, Inc. (OCAI). OCAI then contacts the Bagayawa garbage collection trucks and schedules the collection within the Ortigas Center. Bagayawa is under the larger IPM collection company servicing Pasig City.

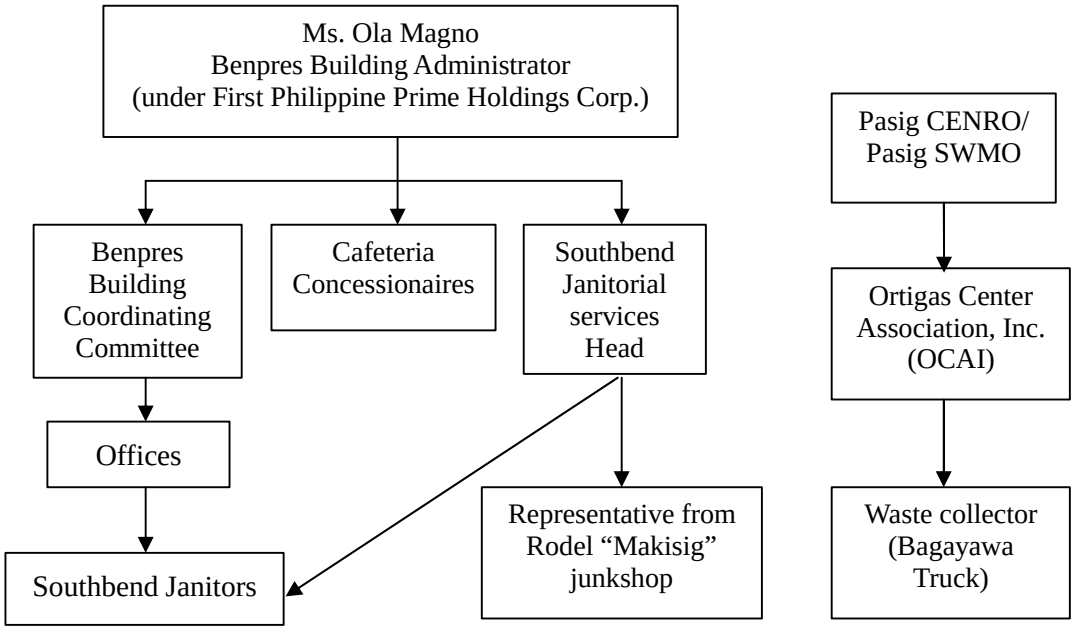


Figure 1.4.1 Implementation Structure in Benpres Building

1.4.4 Achievement

(1) Implementation Schedule

The abovementioned activities were implemented as in the schedule below.

Table 1.4.4 Activity Schedule in Benpres Building

Week	Activities
5-9 Nov. 2007	• Finish Solid Waste Management and Collection Plan proposals, and discuss with key persons for approval
12-16 Nov. 2007	• Design, preparation, procurement and installation of IEC materials and infrastructure • Presentation of SAGIP Environment, Pasig CENRO/ SWMO and OCAI to BBCC, and planning for launching of program
Nov. 28, 2007	• Installation of kitchen waste pails and IEC posters for offices • Training of regarding proper waste segregation • Implementation of Solid Waste Management and Collection Plan in Benpres • Start of monitoring
28 Nov. 2007 until end of December 2007	• Monitoring • Documentation

(2) IEC Materials and Equipment Distributed

The IEC materials and equipment distributed in Benpres Building are summarized in Table 1.3.6. In addition, Benpres Building has started utilizing the existing waste bin for segregation for the original purpose and established a storage room for collected waste papers.

Table 1.4.5 IEC Materials and Equipment Distributed in Benpres Building

Area	Containers/IEC Materials	Quantity	Notes
Each tenant office Communal canteen Elevator	IEC posters containing instructions about proper solid waste disposal	Total 24	One poster per office
Pantries of tenant offices	Plastic containers for leftover food	11	One container per one pantry
Waste paper storage at basement	Segregation bin for paper with four compartments	1	
Outdoor waste bins	Tarpaulin labels for three compartments (recyclables, garden waste, residuals)	3	

(3) Outcomes

Benpres Building has adopted the following policy for solid waste management, and Benpres Building Administrator has informed the tenant offices of the policy to follow.

1. No littering within and around the Benpres building.
2. Waste materials should be placed on their proper containers.
3. Waste materials should be segregated before disposal.
4. Drink containers (PET Bottles, Aluminum cans) should be emptied in sinks before disposal.
5. Paper should not be crumpled.
6. No smoking near the paper boxes or in the storage area.
7. Segregation bins should be secured against vandalism or damage.
8. Personal trashcans are encouraged to contain only residuals.

Quality of the recyclables recovered from waste bins after the start of the case study will be evaluated with the data on volume and value of the recyclables later. Recyclable segregation bins and food waste bins at the office pantries have been installed (see pictures below). Waste papers are collected and brought to a junkshop every day; this works as a part of fire prevention. The common storage areas for recyclables have been established (use of the existing waste bin has been activated, and a storage for collected waste paper is newly established).



Recyclable Segregation Bin at Office Pantry



Food Waste Bin at Office Pantry



Poster in Office



Use of Existing Waste Segregation Bin



Collected PET Bottles



Collected Recyclables Weighed by Junkshop

The following table shows the volume and value of recyclables collected at Benpres Building before the case study (during five working days and one weekend in May 2007).

Table 1.4.6 Volume and Value of Recyclables at Benpres Building before the Case Study

Recyclable	Weight (kg)	Unit Price (PhP/kg)	Value (PhP)	Daily Ave. (kg/d)
White paper	84	8.00	672.00	12.00
Newspaper	70	4.00	280.00	10.00
Cartons	58	2.00	116.00	8.29
Assorted paper	7	1.00	7.00	1.00
Shredded white	72	9.00	648.00	10.29
PET	4	15.00	60.00	0.57
HDPE	16	10.00	160.00	2.29
Aluminum cans	1.3	1 peso/pc	72.00	

*Volume is calculated based on a weekly volume.

The following data were gathered in two separate selling periods each still covering seven days of collection. While volumes did not vary significantly from those prior to the start of the case study, it should be noted that the interventions for Benpres were more on improving the quality of the recyclables being received, as well as having a communal storage area for paper and wet recyclables.

Table 1.4.7 Volume and Value of Recyclables Collected at Benpres Building during the Case Study

Recyclable	Weight (kg)	Unit Price (PhP/kg)	Value (PhP)	Daily Ave. (kg/d)
White paper	60.5	8.00	484.00	8.64
Newspaper	40	4.00	160.00	5.71
Cartons	55.5	2.00	111.00	7.93
Assorted paper	34	1.00	34.00	4.86
Shredded white	12	9.00	108.00	1.71
PET	8.5	15.00	127.50	1.21
HDPE	4	10.00	40.00	0.57
Aluminum cans	3.69	1 peso/pc	203.00	0.53

1.5 Recyclables Collection in Commission on Human Rights of the Philippines

1.5.1 Current conditions and issues

(1) Site profile

Commission on Human Rights of the Philippines (hereinafter referred to as CHRP) is a government organization and has its central office in Quezon City. CHRP building is located in Barangay UP Campus, whose land is owned by the University of the Philippines. There is a junkshop within the premises of the University; it has been collecting recyclables before the university was established. The site profile is summarized in Table 1.5.1, and some pictures representing the site are shown below.

Table 1.5.1 Profile of Commission on Human Rights of the Philippines

Location	Bgy. UP Campus, Quezon City
Size	270 employees 1 building, 3 floors, 24 offices
Management organization	General Services Division is in charge of waste management in the CHRP building.
Reasons for being selected as case study site	• The management of CHRP is supportive of the case study. • Location within the same barangay as one of the residential area study sites may give additional insights of dynamics at LGU level.



Overview of the Building



Outdoor Waste Bin



Collected Waste



Recyclables Recovered from Waste



Recyclables in Storage



Recyclables Sorted at Junkshop

(2) Waste Management Practices

Waste management practices in the CHRP as of August 2007 are summarized as follows:

Table 1.5.2 Waste Management in Commission of Human Rights

Recyclables Volume/ Characteristics	• Significant amount of paper waste is generated. • Recyclables are mixed with biodegradable or food wastes (no wet vs. dry waste segregation).
Solid Waste Management	• There is no waste segregation practice in the office. Because workers have lunch at their desks (there is no canteen in the CHRP building), waste paper in the waste bin is soiled with food waste. • The solid waste management plan has not been prepared yet. • CHRP has a policy to regarding the use of white paper (one-side unused white paper which contains non-confidential information should be collected and converted into memo-pads) • Waste paper collected by janitors is stored in a janitor lounge where fuel oil in a coke bottle is also stored. The janitor lounge does not have enough space for properly storing and processing recyclables. • The junkshop who buys recyclables from the janitors at the CHRP building proposes that if the recyclables are processed, he will buy them at higher price. • Janitors are not so concerned about their health and safety during their collecting recyclables.

1.5.2 Needs Assessment

The needs of CHRP in the field of solid waste management were identified at the focus group discussions as follows:

a. The General Services Division wants to make their reuse policy for paper to be more effective

b. The General Services Division wish to minimize littering by stray cats by managing their kitchen waste

c. Janitors wish the offices would segregate to reduce processing of the solid waste and increase recyclables collection especially paper that is contaminated with food waste

1.5.3 Recyclables Collection Plan

(1) Expected Outcomes and Activities

Based on the above needs assessment, expected outcomes and corresponding activities are planned as in the following table.

Table 1.5.3 Expected Outcomes and Activities in Commission on Human Rights

Expected Outcome	Activity
CHRP employees segregate wastes according to the instructions	• Develop a policy on solid waste management • Give the employees and the janitors instructions on waste segregation • Install segregation frames at each floor and waste paper bins for each office • Take out individual trashcans from the offices

Wastes in CHRP will be handled as follows:

Table 1.5.4 Ways to Handle Wastes in CHRP

Type of Solid Waste	Leftover Food	White paper (both sides used)	White paper (with confidential information)	Newspaper	Waste paper (Scratch, Cartons)	Recyclables (PET, Aluminum Cans)	Residuals	Yard waste (leaves and branches)
Intermediate Container	Food Receptacles in office then food waste bin in corridor	White paper boxes in office	Shredder in office	Newspaper Boxes in office	Wastepaper Boxes in office	Recyclables Bin in corridor	Residuals Bin in corridor	
Person Responsible for placing waste in correct container	Office employees	Office employees	Office employees	Office employees	Office employees (assistance from janitor as needed when transferring contents to wastepaper bin in corridor)			Janitor
Schedule of	Daily; and	Daily	Daily	Daily	Daily	Daily	Daily	Daily

Type of Solid Waste	Leftover Food	White paper (both sides used)	White paper (with confidential information)	Newspaper	Waste paper (Scratch, Cartons)	Recyclables (PET, Aluminum Cans)	Residuals	Yard waste (leaves and branches)
Intermediate Collection	immediately as needed							
End Destination of Solid Waste	Pet Food Collector (office employees); Composting Area for spoiled, inedible and uncollected leftovers	Recyclables storage area	Recyclables storage area	Recyclables storage area	Recyclables storage area (for immediate sorting of recyclables collected)	Recyclables storage area (for immediate sorting of recyclables collected)	Garbage Storage Facility; for eventual collection by EPWMD residuals waste truck	Yard; Composting Area
Person Responsible for Transfer of Waste to End Destination	Janitor							
Schedule of End Collection	Daily	To be coordinated with junkshop					Monday, Wednesday, Friday	NA

(2) Structure for implementation

The waste segregation and recycling is implemented by the structure as indicated in Figure 1.5.1. The General Service Division supervises the program. Representatives from each floor (floor leaders) are responsible for the dissemination of information and education regarding the solid waste management on their corresponding floors. Administrative officer is responsible for the dissemination of information and education regarding the solid waste management within the building and ensures that solid waste segregation and collection measures adopted for offices, restrooms, and yard areas are effectively implemented in coordination with the floor leaders and the maintenance supervisor.

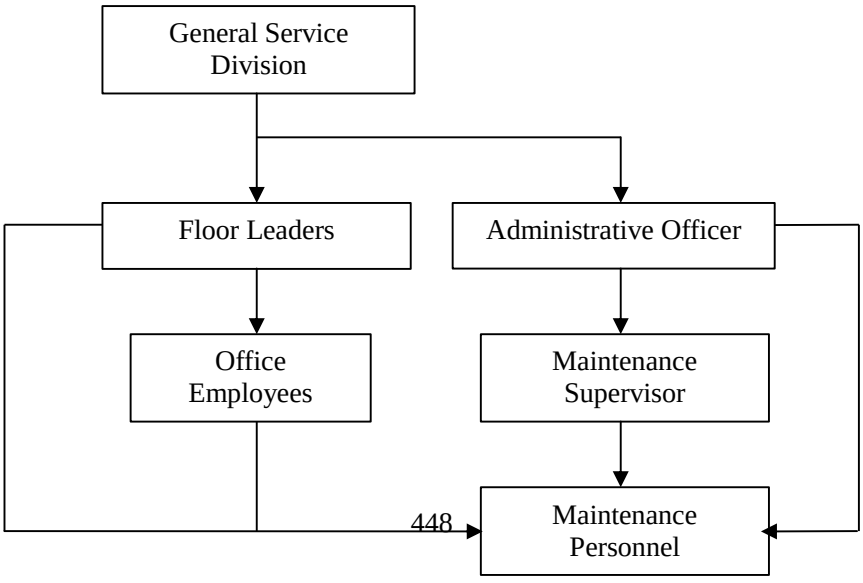


Figure 1.5.1 Structure for Implementation in Commission
on Human Rights of the Philippines

1.5.4 Achievement

(1) Implementation Schedule

The abovementioned activities were implemented as in the schedule below.

Table 1.5.5 Activity Schedule in Commission on Human Rights of the Philippines

Week	Activities
5-9 Nov. 2007	• Finish Solid Waste Management and Collection Plan proposals, and discuss with key persons for approval
12-16 Nov. 2007	• Design, procurement/preparation and installation of IEC materials and infrastructure • Presentation of SAGIP Environment and planning for launching of program
19-23 Nov. 2007	• Installation of kitchen waste pails and IEC posters for offices • Room to room visits • Training of regarding proper waste segregation; • Implementation of Solid Waste Management and Collection Plan • Start of monitoring.
26 Nov. 2007 until the end of December 2007	• Monitoring; • Documentation

(2) IEC Materials and Equipment Distributed

The IEC materials and equipment distributed in UP Bliss are summarized in Table 1.3.6.

Table 1.5.6 IEC Materials and Equipment Distributed in Commission on Human Rights

Area	Container / IEC Material	No. of Units	Notes
Offices	Waste paper box with sign	24	
	Poster identifying different office wastes	24	
Corridors	Waste segregation bin with sign	7 (2 per floor for three floors, and 1 at the extended wing)	Includes food waste, waste paper, recyclables, and residuals containers
Corridor	Program poster	1	To serve as reminder for visitors that CHRP practices segregation

(3) Outcomes

CHRP has adopted the following policy on solid waste management.

1. No Littering within and around the CHRP building premises.
2. Waste materials should be placed on their proper containers.
3. Waste materials should be segregated before disposal.
4. Non- confidential white paper should be used on both sides before disposal.
5. Paper should not be crumpled.
6. Drink containers such as mineral water bottles, and aluminum cans should be emptied of its contents before putting in the container to avoid pests.
7. No smoking near the paper boxes or in the storage area.
8. Segregation bins should be secured against vandalism or damage.
9. Personal trash cans will be removed so that garbage segregation and collection will be centralized at the office level.
10. Employees will be encouraged to participate in segregation through IEC and orientation sessions, also promoting the benefits of standing up, stretching and walking to the segregation area to through their trash.

By the early December 2007, two waste segregation frames have been installed on the corridor of each floor (see picture "Segregation Frame on the Corridor" below), and individual trash cans have been removed from the offices except one that has lots of visitors. There are only waste paper bins for collecting used white papers within the office space (see picture "Waste Paper Bin" below). Employees have started following the waste segregation rule (see pictures "Segregated Waste in the Frame" below)



Segregation Frame on the Corridor



Food Waste



Waste Paper

Segregated Waste in the Frame



Recyclables





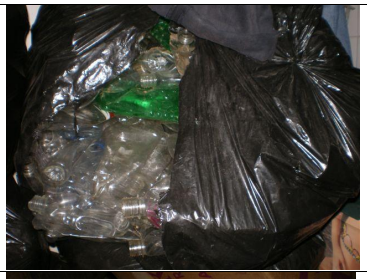
Residuals

Segregated Waste in the Frame

Poster on the Wall



Waste Paper Bin



PET Bottles



Aluminum cans

Sorted Recyclables

The following table shows the volume and value of recyclables collected at CHRP before the case study. They will be compared with the same kind of data after the case study period to see the impact of the activities under the case study.

Table 1.5.7 Volume and Value of Recyclables Collected at Commission on Human Rights before the Case Study

Recyclable	At Primary Collection (Sold by Collectors to Junkshop)		At Consolidator (Sold by Junkshop to Consolidator)	
	Volume (per month)	Unit Price*	Volume (per month)	Unit Price
White Paper	208 kg	P7.00/kg	1 ton	P7.00/kg
Newspaper/ Colored	42 kg	P4.50/kg		P5.00/kg
Cartons	6.5	3.00/ kg	2 tons	
Assorted paper	26 kg		2 tons	
Plastic PET	3 kg	P17.00/kg		P18 (unprocessed) P22 (processed) P12/ kg (colored PET)
Plastic hard	1.5 kg	P10.00/kg		P10.00/kg
Residual plastics				P0.10/ kg
Aluminum Cans	1.6 kg	P60/kg	10-25 kilos	P60/kg
Tin Cans				
Glass bottles			Small volume	

The following table reflects the total volume of recyclables collected at CHRP and sold by the janitors. This covers two transactions that they were able to record during the case study period however the exact length of time this covers was indeterminate. The junkshop they sell to (Ben Almaden's Junkshop) is located within Bgy. UP Campus, is a member of the Linis Ganda network and has been in operation for at least 10 years.

Table 1.5.8 Volume and Value of Recyclables Collected at Commission on Human Rights during the Case Study

Recyclable	Weight (kg)	Unit Price (PhP/kg)	Value (PhP)
White paper	96	7-8 pesos	717.00
Newspaper	109	4.5 - 5.00 pesos	499.50
Cartons	20	3.00	60.00
Assorted paper	15	1.00	15.00
PET	28	15-20	452.50
HDPE	1	10.00	10.00
Aluminum cans	4	52.00	208.00

1.6 Recyclable Collection in New Era High School

1.6.1 Current conditions and issues

(1) Site profile

New Era High School (hereinafter referred to as NEHS) is a public school and has about 3,400 students. Due to an increase in students who used to go to private high schools transferred to NEHS (a public school cannot refuse the transferring students), the school facility is not enough to accommodate all the students at one time. The school facility is used on a two-shift system; the first and the third grade students use the classrooms from 6:00 to 12:40, and the second and the fourth grade students from 12:40 to 19:20. The site profile is summarized in Table 1.6.1, and some pictures representing the site are shown below.

Table 1.6.1 Profile of New Era High School

Location	Bgy. New Era, Quezon City
Size	About 3,400 students 5 buildings, 28 class rooms
Management organization	One of the teachers has experiences in preparing a school-wide solid waste management plan (attended one-day seminar organized by Miriam Collage)
Reasons for being selected as case study site	• Profile is representative of typical urban public high school • There was a previous intervention about waste segregation

(2) Waste Management Practices

Waste management practices in the NEHS as of August 2007 are summarized as follows:

Table 1.6.2 Waste Management Issues in New Era High School

Recyclables Volume/Characteristics	• Significant volume of PET bottles and plastic cups, and some paper and cans are generated (students buy and eat snacks during the morning and afternoon recess).
Solid Waste Management	• Waste bins are in place around the campus and are already designed for segregation purposes, but the labels for segregation have been taken off due to students' mischief. Therefore, wastes are all mixed in the waste bins. • There are janitors in the school to collect waste from the common areas. Students are in charge of bringing waste in plastic bags in the classrooms to the waste storage area. • Students are told not to bring their snacks including drinks into the classrooms. However, since more than 1,000 students come to the small canteens to buy snacks during the recess (10 min.), students are prone to brake the rule. • Once the waste segregation was practiced for about three months or so when the labels were on the waste bins. After the labels were taken off, students became not practicing waste segregation any more. • Teachers' workload is already heavy; it is difficult to spend extra time for them to educate their students about waste segregation.



Waste Bin



Waste Bin

	
Discarded Waste (Unsegregated)	Waste Storage for Municipal Collection

1.6.2 Needs Assessment

The needs and concerns of NEHS in the field of solid waste management were identified at the focus group discussions as follows:

a. Main concern of teachers is littering in the corridors, school grounds and inside the classroom;

b. Janitor to student/ faculty ratio is 1:900 hence cleanliness and maintenance is a major problem;

c. Poor segregation at source makes it difficult for janitors to recover recyclables to sell;

d. Main source of solid waste problem would be waste related to eating and refreshments;

e. The mixing of biodegradable waste with recyclables and residuals causes very foul odor emitting from their mini-dumpsite within the school premises;

f. The mini-dumpsite poses a health hazard to the school population and greatly affects the atmosphere conducive to learning; and

g. Students who clean or pick up trash are teased/ laughed upon.

1.6.3 Recyclables Collection Plan

(1) Expected Outcomes and Activities

Based on the above needs assessment, expected outputs and corresponding activities are planned as in the following table.

Table 1.6.3 Expected Outcomes and Activities in New Rea High School

Expected Outcome	Activity
Students are conducting waste segregation according	• Hold meetings with school administrators and teachers to: (1) establish and coordinate efforts aimed at improving

to the instructions	state of waste management and (2) determine specific plans of action that may be implemented to improve state of waste management at NEHS • Hold seminars for teachers (class advisers) for effective communication or instruction of waste segregation topics to students • Hold seminars for canteen personnel for proper wet vs. dry waste segregation • Provide NEHS with segregation frames and posters • Each class prepares waste paper bin • Hold school wide competitions for the cleanest classroom.

Wastes in NEHS will be handled as follows:

Table 1.6.4 Ways to Handle Wastes at New Era High School (Classroom)

Type of Solid Waste	**Paper Waste**	**Food Waste**	**Liquid Waste**	**Recyclables**	**Residuals**
Intermediate Container	Waste paper bin	Food waste container	Liquid waste container	Recyclables container	Residuals container
Person Responsible for placing waste in correct container	To be ensured and supervised by all teachers.				
Schedule of Intermediate Collection	Daily; and immediately as needed				
End Destination of Solid Waste	Recyclables storage area (for immediate sorting of recyclables collected)	Food waste container (in canteen area), to be eventually collected by food waste collector	Drainage	Recyclables storage area (for immediate sorting of recyclables collected)	Dumpsite area within school grounds, for eventual collection by EPWMD residuals waste truck
Person Responsible for Transfer of Waste to End Destination	Utility personnel assigned to classroom area.				
Schedule of End Collection	Coordinated with barangay junkshop.	Daily collection by canteen staff	As needed	Coordinated with barangay junkshop.	As scheduled by EPWMD.

(2) Structure for implementation

The recyclables segregation/collection will be implemented by the following entities.

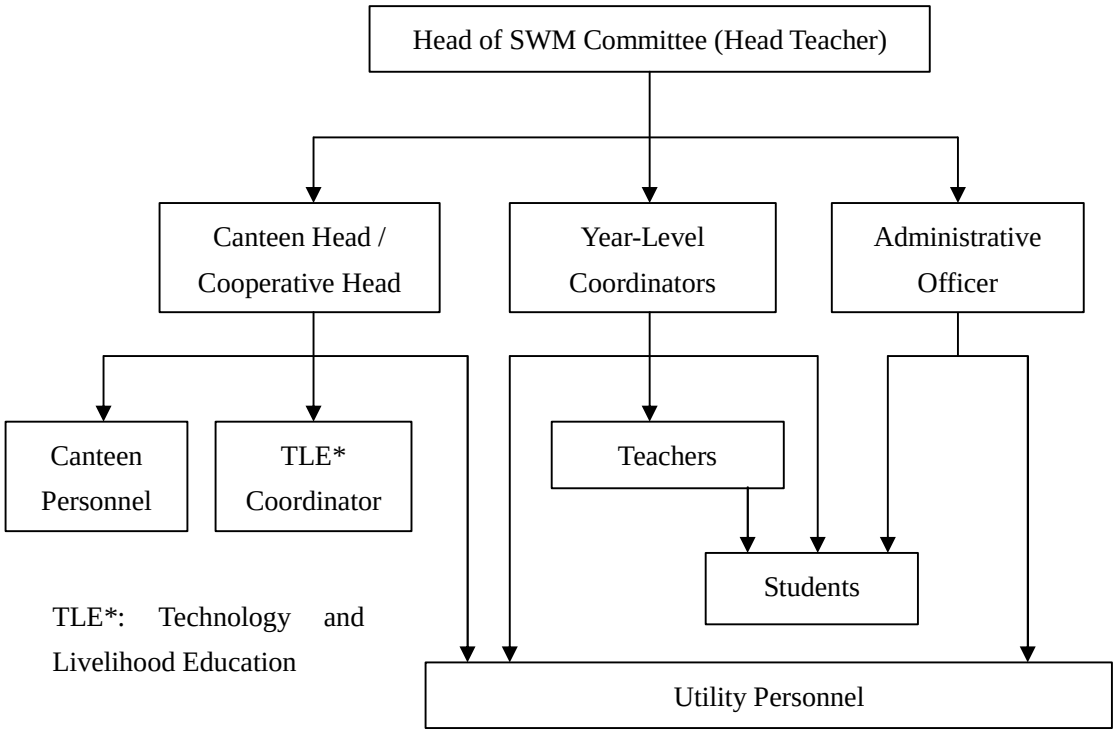


Figure 1.6.1 Structure for Implementation in New Era High School

1.6.4 Achievement

(1) Implementation Schedule

The abovementioned activities were implemented by the following schedule.

Table 1.6.5 Activity Schedule in New Era High School

Week	Activities
23-29 Sep.2007	• Finish Solid Waste Management and Collection Plan, and discuss with key persons for their approval
30 Sep.- 3 Nov. 2007	• Design, procurement, and preparation, of IEC materials and infrastructure

Week	Activities
4-10 Nov. 2007	• Training of canteen and utility personnel regarding proper waste segregation; • Grand meeting with key personnel (especially teachers) regarding implementation of Solid Waste Management and Collection Plan.
11-17 Nov. 2007	• Implementation of Solid Waste Management and Collection Plan in NEHS • Installation of segregation bins and waste paper boxes • Room to room campaigns • Start of monitoring.
18-24 Nov. 2007 onwards until the end of December	• Monitoring; • Documentation

(2) IEC Materials and Equipment Distributed

The IEC materials and equipment distributed are summarized in Table 1.2.6. Each class was asked to prepare one waste paper bin by wrapping a corrugated cardboard box with color paper so that students can distinguish them from a regular waste box.

Table 1.6.6 IEC Materials and Equipment Distributed in New Era High School

Area	Container / IEC Material	No. of Units	Notes
Canteen	Compostables Container	1	Inside kitchen
	Segregation Frame with sign	1	Dining area, includes bins for food waste, recyclables, liquid waste, and residuals
School Buildings and Classrooms	Waste Paper Bin	56 (2 per classroom)	Two classes are assigned to use a room. Each class was asked to prepare a waste paper bin.
	Segregation Frame with sign	9 (average of 2-3 per building)	Includes bins for food waste, recyclables, liquid waste, and residuals
School Grounds	Segregation Frame with sign	3 (2 for the canteen and one near the SSG office)	Includes bins for food waste, recyclables, liquid waste, and residuals
	Tarpaulin visually illustrating solid waste collection plan and detailing categories of waste	2	Posted on the school building wall near the gate
	Program Poster detailing the objectives of the study	1	Posted in the administration building

(3) Outcomes

Segregation frames have been installed at the canteen and each floor of the school buildings, and the students have started segregating waste to food waste, liquid waste (leftover drinks), recyclables (plastics and cans) and residuals (see the picture "Segregation Frame at Canteen" below). A large poster to explain waste types and proper segregation practices has been put on the wall of the school building near the school gate so that all the students can see it (see the picture "Poster on Explanation of Waste Type"). In addition, there is a poster on recyclables collection campaign to inform students of the activities in the case study as school wide activities (see the picture "Poster on Recyclables Collection Campaign" below). Although there are some classes that have not prepared a waste paper bin, most of the classes have prepared it and started waste paper segregation (see the picture "Waste Paper Bin" below).

NEHS has integrated recyclables collection as a school activity, and they have started to hold cleanest classroom competitions. According to the teacher in charge of coordinating the recyclables collection, there used be a pile of waste in the classrooms, but the environment has been much improved since the recyclables collection campaign.



Poster on Explanation of Waste Type



Poster on Recyclables Collection Campaign



Segregation Frame at Canteen



Food Waste



Funnel for Liquid Waste

Segregated Waste in the Frame



Recyclables



Residuals

Segregated Waste in the Frame



Jar for Storing Liquid Waste (Segregation Frame)



Waste Paper Bin (for AM/PM classes)



Collected Waste Paper

The following table shows the volume and price of recyclables collected at NEHS and before the case study.

Table 1.6.7 Volume and Value of Recyclables Collected at New Era High School before the Case Study

Recyclable	At Primary Collector (sold by collector to junkshop)	
	Volume*(per month)	Unit Price**
White Paper	(wet) 49 kg	Wet: P1/kg Dry: P7/kg
Cartons	25 kg	P4/kg
Plastic PET	Bottles only, cleaned and stripped of labels – 33 kg	P23/kg
Other Plastics	Plastic cups + mineral bottle caps – 34 kg	Plastic cups + mineral bottle caps : P20/kg

*Amounts only reflect 2 weeks' worth of collection.

** Price/kg indicated are as set by direct junkshop buyer; no middle-man involved.

The Table below shows the volumes and values of the recyclables sold by one of the janitors after a

three-week period. This does not reflect however the total recyclables that were actually recovered, since the other janitor who also collects these recyclables has not yet sold her share. There are also reports of teachers who are now beginning to sell the paper collected from the classrooms although no monitoring data of this was obtained.

Table 1.6.8 Volume and Value of Recyclables Collected at New Era High School during the Case Study

Recyclable	Weight (kg)	Unit Price (PhP/kg)	Value (PhP)	Daily Ave. (kg/d)
White paper	14	10.00	140.00	0.67
Cartons	20	5.50	110.00	0.95
PET	8	24.00	192.00	0.38
HDPE	83	20.00	1,660.00	3.95
spoon & fork	26	10.00	260.00	1.24
tin cans	14	5.50	77.00	0.67

During the Waste Analysis and Characterization Survey (WACS) conducted by the QC EPWMD for this site under the case study baseline data gathering, it was discovered that over a one-week period, the school generates about 24 kilos of paper, 26 kilos of plastic, and nearly 2 kilos of tin cans. The rates calculated under the recorded selling are still less than the potential rates as determined in the previous WACS. Still there have been improvements observed – littering has reduced noticeably in the corridors and the classrooms. One classroom that was observed to have a small garbage pile at the back corner was given the "Most Improved Classroom" citation since it was practicing segregation already during one of the visits to the site after project implementation.

Recent visits after the Christmas vacation however revealed that some students have reverted back to their old habits of littering and not segregating. Constant reiteration therefore is crucial in a school set-up, since every year there are new students coming in, and school breaks take away some of the momentum established by cleanliness campaigns such as this.

1.7 Recyclables Collection in SM Sta. Mesa Food Court

1.7.1 Current conditions and issues

(1) Site profile

The food court is located on the basement of the SM Sta. Mesa shopping center and has 19 tenants that prepare and serve food and drinks in their kitchen and 23 food stalls that only sell prepared foods such as bread and cookies. Customers can buy their food and drinks at any of the tenants/food stalls and eat at tables in the food court. After eating, customers can throw their wastes and leftover food and drinks into trash bins or leave them on the table. The staffs called bus boys collect and segregate used plates, cups, cans, and silverwares from the tables. The reusable plates and silverwares are washed in the backyard of the food court, and plastic cups and aluminum cans are segregated for collection. The site profile is summarized in Table 1.7.1, and some pictures

representing the site are shown below.

Table 1.7.1 Profile of SM Sta. Mesa Food Court

Location	Quezon City (straddles the border of QC, Manila and San Juan)
Size	Covers most of the basement 19 tenants (with kitchen), 23 food stalls (without kitchen)
Management organization	Food court management is in charge of solid waste management at the food court.
Reasons for being selected as case study site	• Some levels of segregation of recyclables are practiced. • Replicable to the food courts in other SM shopping center.



Recyclables Collected by Busboys (Dishwashing Area)



Waste Storage Area



Signage at Waste Storage Area



Collected Food Waste and Plastic Bottles

	
Signage at Waste Storage Area	Collected Cardboard

(2) Waste Management Practices

Waste management practices in the SM Sta. Mesa Food Court are summarized as follows:

Table 1.7.2 Waste Management in SM Sta. Mesa Food Court

Recyclables Volume/Characteristics	• Significant volumes of PET, plastic cups, aluminum cans are generated. • Segregation of recyclables (plastic cups, PET bottles, and aluminum cans) from tables in the food court is practiced.
Solid Waste Management	• Inadequate or inconsistent orientation/training of maintenance employees with regards to wet vs. dry waste collection policy as enforced on tenants. • Tenants may not be fully aware of importance of proper segregation of waste materials generated from their kitchen operations although there are policies on wet vs. dry waste segregation. • Identified types of materials segregated by busboys can still be expanded to maximize recyclables collected in their efficient operations already in place.

1.7.2 Needs Assessment

The needs and concerns of SM Sta. Mesa Food Court were identified at the focus group discussions as follows.

a. Food court tenants sometimes do not abide by mall policies of segregation

b. Buyer of recyclables only gets aluminum cans, cups and PET bottles, not other types of recyclables

c. Limited storage space for additional types of recyclables such as plastic straws, especially since it is not bought daily

d. From SM upper management, they want to see how this could be replicated in other Food Courts

1.7.3 Recyclables Collection Plan

(1) Expected Outcomes and Activities

Based on the above needs and concerns assessment, expected outcomes and corresponding activities are planned as in the following table.

Table 1.7.3 Expected Outputs and Activities in SM St. Mesa Food Court

Expected Output	Activity
Recyclables are collected from tables and sold to junkshops in an efficient manner	• Conduct discussions involving concerned mall administrators and hauler to determine: (1) what other types of recyclables may be accepted aside from the ones already being collected; (2) steps that may be taken by administrators to increase value of recyclables being collected • Develop standard orientation/training program for maintenance staff and busboys regarding proper enforcement of wet vs. dry waste segregation policies • Conduct training on the proper enforcement of waste segregation policies • Find buyers of used plastic straws
Tenants practice proper waste segregation	• Prepare and put on posters reminding of proper wet vs. dry segregation to be placed in conspicuous spots in common areas • Prepare and disseminate a booklet containing proper classification of wet vs. dry waste materials, and proper segregation methods for these

Wastes in SM St. Mesa Food Court will be handled as follows.

Table 1.7.4 Ways to Handle Wastes at SM Sta. Mesa Food Court by Waste Type

Type of Solid Waste	Food Waste	Recyclables (plastic cups, PET bottles, tin cans, straws)	Residuals
Intermediate Container	Busboy Carts		

Person Responsible for placing waste in correct container	Busboy personnel		
Schedule of Intermediate Collection	Daily; and immediately as needed		
End Destination of Solid Waste	Food waste collector	Recyclables collection and segregation area; and junkshop/recycler buyers.	Residuals bin for eventual collection by EPWMD residuals waste truck
Person Responsible for Transfer of Waste to End Destination	To be coordinated by Operations Supervisor.	To be coordinated by Operations Supervisor and Food Court Manager.	To be coordinated by Operations Supervisor and Food Court Manager.
Schedule of End Collection	To be coordinated with contact food waste collector	To be coordinated with buyers.	As scheduled by EPWMD.

(2) Structure for implementation

The recyclables segregation/collection will be implemented by the following entities.

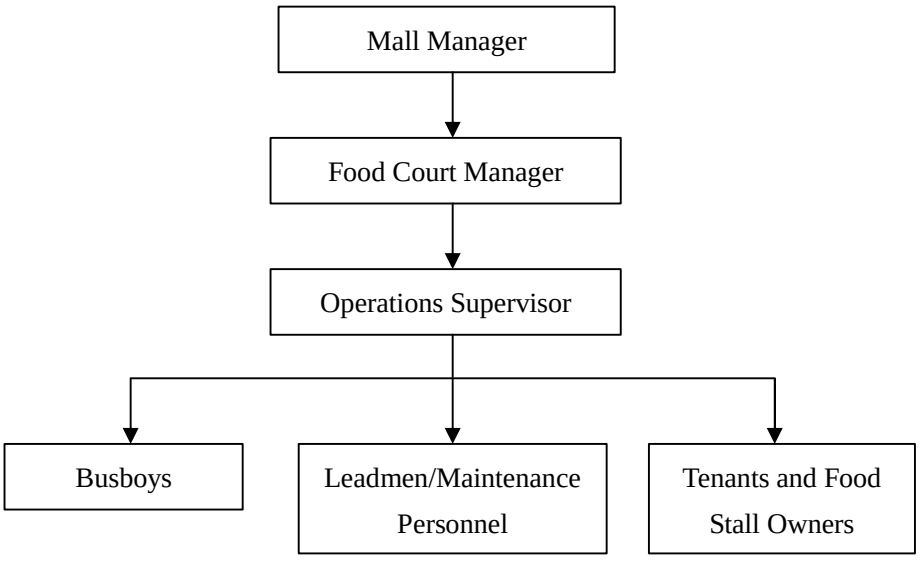


Figure 1.7.1 Structure for Implementation at SM Sta. Mesa Food Court

1.7.4 Achievement

(1) Implementation Schedule

The abovementioned activities were implemented as in the schedule below.

Table 1.7.5 Activity Schedule in SM Sta. Mesa Food Court

Week	Activities
5-9 Nov. 2007	• Finish Solid Waste Management and Collection Plan proposals, and discuss with key persons for approval
12-16 Nov. 2007	• Design, preparation, procurement and installation of IEC materials and infrastructure • Presentation of SAGIP Environment to SM Sta. Mesa Mall management and SM Supermalls upper management • planning for launching of program
19-23 Nov. 2007	• Revisions of IEC materials incorporating SM management comments
26 Nov. – 07 December 2007	• Deployment of IEC materials for stalls • Deployment of SM food court banner
Dec. 8 2007	• Second selling of recyclables during Waste Market • Deployment of prototype push cart IEC material
Jan. 15, 2008	• Deployment of final version of push cart IEC material

(2) IEC Materials and Equipment Distributed in SM Sta. Mesa Food Court

The IEC materials and equipment distributed are summarized in Table 1.7.6.

Table 1.7.6 IEC Materials and Equipment Distributed in SM Sta. Mesa Food Court

Infrastructure Materials	Specifications	Quantity
IEC Posters on pushcart front	Contains information on the busboy pushcart as a segregation module	15
Stall posters	Small poster reminding tenants to segregate wet vs dry waste	30
Tarpaulin	On recyclables collection project and SM Supermalls'	1

(3) Outcomes

After the training of busboys on waste segregation and collection, they started collecting used plastic straws as an additional recyclable (see the picture "Used Straws and Cup Caps Additionally Collected by Busboys" below). Although the existing waste hauler does buy used plastic straws, the Food Court has found a buyer of the straws at the monthly held Waste Market at SM Sta. Mesa shopping center.

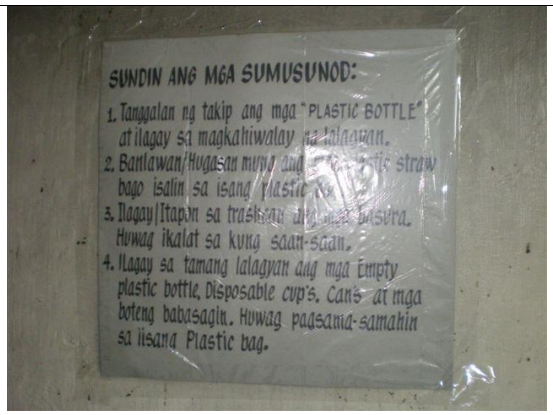
A sign to inform customers at the food court how the collected wastes are recycled is attached to a pushcart that the busboy uses for waste collection, which is expected to increase awareness of the general public towards recycling (see the picture "Sign for Awareness Raising of the Customers for Waste Segregation and Recycling" below).



Used Straws and Cup Caps Additionally Collected by Busboys



Waste Plastics Collected from the Food Court and Sold to Junkshop



Poster on Waste Segregation Policy



Poster on Proper Waste Segregation



Sign for Awareness Raising of the Customers for Waste Segregation and Recycling



Plastic Bottle Caps Collected from Tables

The following table shows the volume and price of recyclables collected at SM Sta. Mesa Food Court before the case study. They will be compared with the same kind of data after the case study

period to see the impact of the activities under the case study.

Table 1.7.7 Volume and Value of Recyclable Collected at SM Sta. Mesa Food Court before the Case Study

Month	Plastic Cups		Plastic Bottles		Cans	
	Quantity (kg)	Peso equivalent	Quantity (kg)	Peso equivalent	Quantity (kg)	Peso equivalent
May 2007	721	7210	279	5580	35	1750
June 2007	773	7730	352	7040	43	2150
July 1-15, 2007	418	4180	192	3840	24	1200

SM Sta. Mesa Food Court was able to sell other types of recyclables, aside from those being collected daily by Bagayawa (PET bottles, aluminum cans and plastic cups), in two Waste Markets. These events are being held in SM and Ayala malls for more than a year, wherein the public could bring their recyclables and e-waste to the malls and sell it to recyclers and consolidators. During the two Waste Markets held in SM Sta. Mesa last Oct. 27 and Dec. 8, the Food Court was able to sell various types of recyclables, listed in the Table below.

The volumes listed here reflect 66 days of collection, except for the PET, aluminum cans, and plastic cups, which are regularly sold to Bagayawa. During the days leading to the Waste Markets however, the Food Court stores these three recyclables over a few days and opts to sell these during the Waste Markets. The volumes of PET, aluminum cans and plastic cups (highlighted in pink) reflect six days of collection. Plastics and aluminum cans are sold to Polytrader Plastic Products, with recycling facility in Valenzuela, while the rest were sold to EJM Junkshop, operating under the QC Multi-purpose Cooperative.

Table 1.7.8 Volume and Value of Recyclable Collected at SM Sta. Mesa Food Court during the Case Study

Recyclable	Weight (kg)	Unit Price (PhP/kg)	Value (PhP)	Daily Ave. (kg/d)
Newspaper	60	5.50	330.00	0.91
Cartons	13	4.50	58.50	0.20
PET	61.5	18.00	1,107.00	10.25
HDPE	188.5	12.00	2,262.00	long storage
Plastic Straws	160.5	5.00	802.50	2.43
Plastic cups	161	10.00	1,610.00	26.83
Assorted plastics	9	5.00	45.00	0.14
Aluminum cans	15	55.00	825.00	2.50
Metal scraps	26	11.00	286.00	long storage
Fender/ mudguard	18	10.00	180.00	
Bottles (lump) - assorted pcs	826	0.50	482.20	12.52
Shards	39	0.50	19.50	0.59

The following tables summarize the total amount and value of collected recyclables after the case study interventions at all the case study sites.

Table 1.7.9 Total Amount of Collected Recyclables after Interventions

Study Site	Study Phase	Period Covered	Selling Frequency	Amount of Collected Recyclables: Paper (kg)	Plastic (kg)	Metal (kg)	Subtotals (kg)	Glass # bottles
GK	Before	no monitored selling						
	After	4 months	3	34.25	22.05	11.00	67.30	173
Libis MRF	Before	recyclables turned over to other barangay MRF for selling with profit sharing						
	After	4 months	4	1,338.00	272.00	467.50	2,238.50	342
CHRP	Before	4 months	1	282.50	4.50	1.60	288.60	0
	After	2 months	2	240.00	29.00	4.00	273.00	0
Benpres	Before	7 days	1	291.00	20.00	1.30	312.30	0
	After	7 days	1	196.00	1.50	1.18	198.68	0
	After	7 days	1	190.00	12.50	3.69	206.19	0
NEHS	Before	no monitored selling						
	After	3 weeks	1	34.00	117.00	14.00	165.00	0
SM Sta. Mesa	Before	regular selling of PET, Aluminum cans, Plastic Cups only						
	After	3 months	2	73.00	358.00	44.00	475.00	828
Subtotals per Material after Interventions				**2,105.25**	**812.05**	**545.37**	**3,462.67**	**1,343**

Table 1.7.10 Total Value of Collected Recyclables after Interventions (PhP)

Study Site	Study Phase	Period Covered	Selling Frequency	Value of Collected Recyclables (PhP): Paper	Plastic	Metal	Glass	Subtotals
GK	Before	no monitored selling						
	After	4 months	3	113.75	386.80	42.00	164.34	706.89
Libis MRF	Before	recyclables turned over to other barangay MRF for selling with profit sharing						
	After	4 months	4	3,490.50	3,860.50	2,587.50	222.90	10,161.40
CHRP	Before	4 months	1	1,690.50	66.00	96.00		1,852.50
	After	2 months	2	1,291.50	462.50	208.00	0.00	1,962.00
Benpres	Before	7 days	1	1,075.00	220.00	72.00		1,367.00
	After	7 days	1	1,001.00	20.00	65.00	0.00	1,086.00
	After	7 days	1	789.00	167.50	203.00	0.00	1,159.50
NEHS	Before	no monitored selling						
	After	3 weeks	1	250.00	2,112.00	77.00	0.00	2,439.00
SM Sta. Mesa	Before	regular selling of PET, Aluminum cans, Plastic Cups only						
	After	3 months	2	388.50	5,826.50	1,291.00	501.70	8,007.70
Subtotals per Material after Interventions				**7,324.25**	**12,835.80**	**3,182.50**	**888.94**	**18,875.99**

2. Case Study II

2.1 Cellular Phone Waste Collection

2.1.1 Executive Summary

The Cell Phone Waste Collection Case Study has two main objectives, namely to increase public awareness on proper disposal of cell phone waste and to assess the feasibility of collection in shops or drop-off points. This study sought to establish baseline data on collection volumes and rates as an estimation of public response to such collection efforts.

The case study had a six-month implementation period, spanning from June to December 2007, which eventually extended to mid-January of 2008. This six-month period was inclusive of planning, development stages and program execution. It involved the participation of six institutions and government agencies, all three network service providers, six major mobile phone manufacturers, three commercial establishments and an accredited treatment-storage-disposal facility for electronic waste. Actual collection and monitoring under this case study was done for a four-month period,

which started with a formal launching on Sept. 14, 2007 at the Dusit Hotel, and ended on Jan. 9, 2008. As of now however, bins for cell phone waste are still deployed at the malls for continuity of collection even after the case study.

Collection was primarily implemented in three Metro Manila cities, particularly only within identified areas of the following three malls: Glorietta and Greenbelt under the Ayala Malls (Makati City); SM Megamall (Mandaluyong City); and Greenhills Shopping Center (San Juan City). Six collection bins were positioned within each of the three malls, with four of these deployed to shops of network service providers Smart and Sun Cellular. This totals to eighteen bins deployed in commercial establishments. Collection was also implemented within two government offices, namely the Department of Trade and Industry - Board of Investments building located along Sen. Gil Puyat Ave., Makati City, and the Department of Environment and Natural Resources compound along Visayas Ave., Quezon City. These two offices had one bin each, generally located in the lobby or first floor of the building.

Over the 4-month collection period, a total of 9,514 pieces of cell phone waste amounting to 280.75 kilograms were collected in the 20 bins. The total potential value of collected waste from the case study would amount to more than PhP 1,900 for close to 281 kilograms of cell phone waste. While dismantling and treatment costs under current systems in the Philippines would amount to around PhP 2,500 for the collected waste during the past four months, the difference is manageable and can be greatly reduced with expanded geographical coverage. Furthermore, ecological and potential health benefits of proper disposal and waste diversion greatly outweigh the incurred cost.

This Case Study led to several milestones in addressing the problem of increasing cell phone waste. It established baseline public participation and collection rates given minimal interventions and developed IEC materials and a blueprint for bins that entice participation without sacrificing functionality. A monitoring and collection protocol was devised and tested and preliminary values and costs with respect to program sustainability were established. Most significantly, it showed that a joint collection program by the government and the private sector, composed of stakeholders within the highly competitive communications industry, is possible.

2.2 Framework and Context

2.2.1 Background and Rationale

(1) Electronic Waste Situation in the Philippines

1) The Growth of the Mobile Phone Industry

The Mobile Phone Industry started in the Philippines in 1991 grew linearly first five years and expanded exponentially since then. After 16 years, there is an estimated 45 million mobile phone subscribers distributed between the three major players in the industry at present, namely, Digitel

Mobile Philippines, Inc. (Sun Cellular), Globe Telecommunications, Inc. and Smart Communications Inc. Figure 1 shows this exponential increase in subscription across the country, covering almost half of the population. This however, is not necessarily a 1:1 correspondence, since there are consumers who opt to have more than one line or switched to another line to avail of product promotional packages.

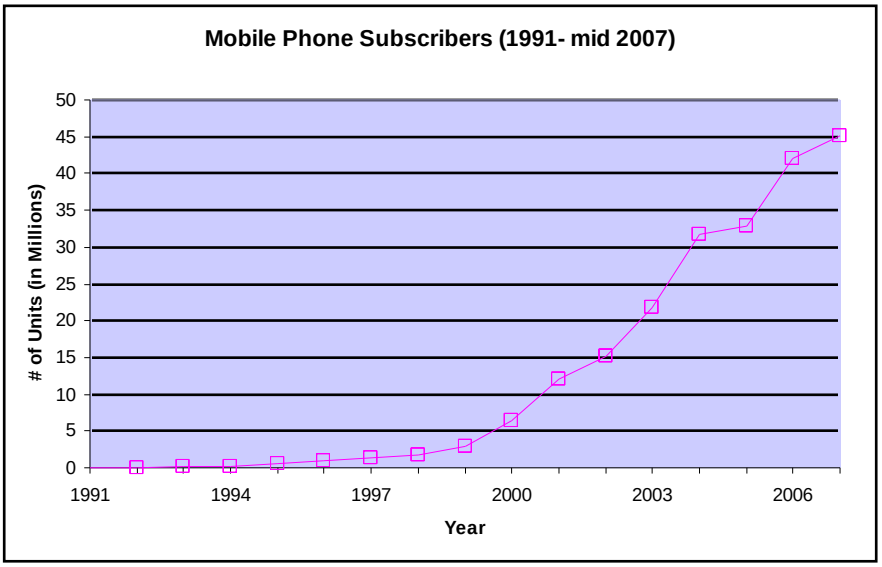


Figure 2.2-1 Mobile Phone Subscribers in the Philippines, 1991-mid 2007

Source: Network service providers subscriber data

It is estimated that the average lifespan of mobile phones, commonly called cellular phones or cell phones locally, is 18 months[1]. This means that consumers usually change their units to more recent models in less than two years. This turnover rate may vary widely in the Philippines, since low income households would tend to prolong its use or pass on old models to relatives, while those with higher purchasing power would keep up with the latest models. Post-paid subscribers of the major network service providers are also given new units every two years as part of their subscription package. Due to consumer behavior, it would be difficult at this time to calculate the amount of cell phones purchased and in obsolescence to date. The amount of subscribers therefore would just be a very rough estimate of the number of cell phones purchased since the 1990s.

Disposal rates are more difficult to establish. To date there are no local studies conducted with regards to quantifying disposal behavior of cell phones and related waste. Most of the old units are kept at home with the anticipation that these could be of future use, however it is possible that batteries and other cell phone related waste are disposed with the municipal waste.

[1] Marcussen, C. H. 2000. Mobile phones, WAP and the internet. Research Center of Bornholm, Denmark. As cited by Inform, Inc. in "Waste in the wireless world", 2002.

2) Policies on Electronic Waste

In the Philippines, prior to its accession to the Basel Convention in 1993, had already enacted the Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 (Republic Act 6969), declaring that it is the policy of the State to "prohibit the entry, even in transit, of hazardous and nuclear wastes and their disposal into the Philippine territorial limits for whatever purpose.[2]" Chapter Seven of the more recent Procedural Manual of Department Administrative Order 92-29 on Hazardous Waste Management released in 2004 reiterates previous administrative orders that electronic assemblies and scraps are one of the recyclable materials containing hazardous substances that may be imported given the proper clearances from the Environmental Management Bureau (EMB)[3].

In terms of electronic waste generated locally, the Implementing Rules and Regulations of Republic Act 9003, otherwise known as the Ecological Solid Waste Management Act of 2000, outlines the strategy for reclamation programs and buy back centers for special waste, under which electronic and electrical waste are classified[4]. There have been some take-back programs initiated by cellular phone companies, which will be discussed further in this report, however these have had limited success or were just taking off at the start of this study. There are also occasional Recyclables Collection Events or Waste Markets spearheaded by the National Solid Waste Management Commission and the Philippine Business for the Environment, in partnership with the local government unit, recyclers or waste consolidators, and the malls which serve as venues. The general public is invited to bring their recyclables and non-traditional waste, such as e-waste, to the venue for direct trade or disposal with the consolidator or recycler of these materials.

(2) The Study on Recycling Industry Development in the Philippines

1) Inception and Framework

RA 9003 mandates the Board of Investments, Department of Trade and Industry (BOI-DTI), as a core member of the National Solid Waste Commission (NSWMC), to carry out the promotion of recycling industries as well as creation and expansion of the recyclable materials market in the Philippines.

To formulate policies and measures to promote recycling industries in the Philippines for enforcement of RA9003, DTI made an official request for providing technical assistance to the Government of Japan (GOJ). This request was validated through a Project Formulation Study in

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[2] Republic Act 6969 (Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990). Section 2, Declaration of Policy.

[3] Department of Environment and Natural Resources Administrative Order 2004-36. Procedural Manual Title III of DAO 92-29, "Hazardous Waste Management."

[4] Department of Environment and Natural Resources Administrative Order 2001-34. Implementing Rules and Regulations of Republic Act 9003. Rule XII, Section 6.

October 2005. As an outcome, the Implementation Agreement was signed between the Government of the Philippines (GOP) and GOJ to conduct the two-year Study on Recycling Industry Development in the Philippines (SRIDP) from July2006 to February 2008[5].

2) Study Objectives and Scope

The objectives of the Study on Recycling Industry Development are as follows:

- Assisting GOP to formulate "the Master Plan and Action Plan for Development of Recycling Industry in the Philippines" in accordance with RA9003;
- Conducting case studies to examine applicability of the Master Plan and Action Plan for Development of Recycling Industry in the Philippines;
- Capacity development of DTI-BOI all through the implementation of the Study.

The target recyclable materials to be studied were grouped into two categories. Traditional recyclables such as the different types of used paper, scrap metals, scrap plastics and glass bottles, were placed under Category I. Category II included electronic waste such as personal computers, televisions refrigerators, and cell phone batteries.

3) Case Study on Cell Phone Waste Collection

The case studies under the Study on Recycling Industry Development were to be carried out to test the applicability of guidelines and policies to be recommended in the Master Plan and Action Plan. The case studies were to be carried out during the second year of the SRIDP. Initially the target areas were Metro Manila and Metro Cebu, but due to certain constraints these were conducted in Metro Manila only.

The Case Study on Cell Phone Waste Collection is the second of three case studies. Case Study 1 is on the use of Information, Education and Communication (IEC) materials for segregation at source by different types of waste generators towards increasing the amount and improving the quality of recyclable materials collected. Case Study 2 is on Cell Phone Waste Collection, discussed in this report. Case Study 3 is on Mobile Plastics Collection and Recycling. Case Studies 1& 2 were conducted by local consultant Environmental & Sustainable Agri-Industrial Planners and Managers (SAGIP-Environment), Inc., while Case Study 3 was executed by the Philippine Plastics Industry Association.

2.2.2 Case Study Goals and Objectives

The Case Study on Cellular Phone Waste Collection in the Philippines was conducted to:

- to increase public awareness on proper disposal of cell phone waste especially among cell

[5] The Study on Recycling Industry in the Philippines Inception Report. 2006. Prepared by EX Corporation, Kokusai Kogyo Co., Ltd.

phone users; and

- to assess the feasibility of developing cell phone waste collection in shops or drop-off points

This Case Study aimed to explore the impact of raising awareness on proper disposal of cell phone batteries, chargers, units and accessories in three areas in Metro Manila by monitoring the volume and corresponding value of collected waste. Furthermore, it sought to establish baseline data on collection rates given the spatial and temporal parameters of the study, and to determine the net value of the collected cell phone waste.

2.2.3 Stakeholders Involved

(1) Composition of the Steering Committee

The Steering Committee was composed of the Department of Industry - Board of Investments (BOI), the National Solid Waste Management Commission (NSWMC), the NSWMC Secretariat through the Department of Environment and Natural Resources – Environmental Management Bureau, and the Japan International Cooperation Agency (JICA) Study Team. The Steering Committee met regularly to discuss direction and strategy of the Case study. Ms. Erlinda Arcellana, head of the Office of Industrial Policy of DTI-BOI, chaired the Steering Committee.

(2) Composition of the Technical Working Group

The Technical Working Group (TWG) is a 21-partner organizations team composed of the Steering Committee members, Cellular Phone Manufacturers, Network Service Providers, Malls, and the E-waste collector/ recycler.

The six cellular phone manufacturers are Alcatel represented by Versatile Telecoms International Inc., LG Electronics Philippines, Inc., Motorola Communications Philippines, Inc., Nokia Philippines, Inc., Samsung Electronics Philippines Corp., and Sony Ericsson Mobile Communications International AB, Philippine Branch.

The three network service providers are Digitel Mobile Philippines, Inc. (Sun Cellular), Globe Telecommunications, Inc. and Smart Communications Inc.

The three participating mall establishments are Ayala Malls Group of Ayala Land, Ortigas and Company Limited Partnership and SM Prime Holdings, Inc.

The E-waste collector/recycler who was in charge of transport and storage was HMR Envirocycle Philippines, Inc., with recycling facility located in Sta. Rosa, Laguna.

This is the first time in the Philippines that the different stakeholders within the highly competitive Cellular Phone Industry have come together to work on a common undertaking.

The Technical Working Group met four times prior to the launching of the pilot project and once after the end of the case study period to ensure a smooth implementation of the project.

(3) Composition of the Case Study Team

The Case Study Team was composed of the following:

1. A Project Manager, who concurrently managed Case Study 1 and ensured the timely and efficient execution of the project;
2. A Study Coordinator, who was coordinating closely with the major stakeholders, program partners and technical working group and assisted in the development of information, education and communication campaigns.
3. A Project Administration Officer, who was in charge of administrative and fiscal concerns of the project including logistics and procurement of materials;
4. An Information, Education and Communication (IEC) Officer, who designed appropriate strategies and materials for information, education and communication campaigns;
5. A Digital Artist, who was in charge of the development of the actual IEC materials;
6. Two Technical Assistants, who monitored collection and gathered data from the field on a weekly basis, and was in charge of sorting and weighing of the collected cell phone waste.

(4) Target stakeholders for collection

Primarily, the target stakeholders identified were the product consumers, particularly the population that purchases cell phones and subscribers of the local service providers. The secondary target stakeholders identified were the cellular phone retail and repair shop owners and staff for their frequent interaction with the consumers. Finally, the third set of targeted audience were the janitors and maintenance personnel specifically in malls where there is a high concentration of cellular phone retail and repair shops, since some consumers and stall tenants throw the cellular phone waste directly to trash bins or leave them on the floor for eventual collection.

2.2.4 Scope and Limitations

(1) Time frame and locations

The case study had a six-month implementation period, spanning from June through December 2007, which eventually extended to mid-January of 2008. This six-month period was inclusive of planning, development stages and actual program execution. Actual collection was done over a 16-week period, from September 14, 2007, to January 9, 2008.

Collection was primarily implemented in three Metro Manila cities, particularly only within identified areas of the following three malls: Glorietta and Greenbelt under the Ayala Malls (Makati City); SM Megamall (Mandaluyong City); and Greenhills Shopping Center (San Juan City). Six collection bins were positioned within each of the three malls, totaling eighteen bins deployed in

commercial establishments.

Collection was also implemented within two government offices, namely the Department of Trade and Industry – Board of Investments building located along Sen. Gil Puyat Ave., Makati City, and the Department of Environment and Natural Resources compound along Visayas Ave., Quezon City. These two offices had one bin each, generally located in the lobby or first floor of the building.

(2) Cellular Phone Waste Types

Initially, the cellular phone waste to be collected was confined to cellular phone batteries, which were perceived to be the most hazardous and problematic in terms of disposal. However, after a series of discussions with the stakeholders and meetings at the Technical Working Group, it was decided that the cellular phone waste types to be collected were to be expanded to include the cellular phone unit, batteries, charges and other accessories such as but not limited to housing/ casings and headsets.

(3) Resources

The Case Study was implemented with a limited budget, which could only accommodate a very streamlined team with limited operations cost. There was also a limitation in terms of manpower in the monitoring of the cellular phone waste collection; hence most of the monitoring activities were conducted by the technical assistants.

Campaign materials were limited to posters which were distributed to the partners for deployment and display in their respective shops, offices or malls. Three informative installations or mini-exhibits were produced to give customers an idea of the advantages of recycling cell phone waste. The budget did not also allow any allocation for print ads or broadcast media. The Case Study was still featured in a few news articles in major dailies which covered the launching of the pilot projects in September.

Initially, the number of collection bins was limited to around 3 bins per mall. Just before the start of the collection proper, additional funds from a previous DTI-BOI project with the United Nations Development Programme (UNDP) allowed construction of ten more bins. A total of twenty bins were produced.

There was no incentive program implemented in the case study. The consumers dropped their cellular phone waste on a purely voluntary basis.

(4) Logistics

Prior to collection by HMR Envirocycle, the cell phone waste deposited in the bins have to be retrieved and stored temporarily until such time that a sufficient amount has been accumulated that would warrant transportation from Metro Manila to the facility in Laguna. There was a limitation in terms of space in the malls to maintain a temporary storage for collected cellular phone items; only one mall was able to provide storage space within their premises. The waste from the other sites was brought to the SAGIP-Environment office after retrieval from the bins, which usually occurred every

four weeks.

There were preparations done for the seminars for technicians and cellular phone retail and repair shop owners and staff; however these did not push through due to the high activity in the malls in preparation for the holiday season.

2.3 Methods and Strategies

The case study generally could be divided into four phases:

- Project planning which included research and data gathering, and consultation with the Steering Committee and Technical Working Group;
- Design and production of the cell phone waste bins and the appropriate information, education and communication (IEC) materials;
- Signing of the Memorandum of Agreement during the launching of the pilot projects under the 2-year JICA study and deployment of bins and IEC materials; and
- Collection proper, monitoring and data analyses.

The results of the Case Study were presented to the public during the Recycling Symposium held on January 24 to 25, 2008, at the Megatrade Hall 3, SM Megamall, Mandaluyong City. Figure 2 illustrates the above mentioned project phases, while Figure 3 shows the timeline of the activities.



Figure 2.3-1 Cell phone waste collection Case Study Methodology

Table 2.3-1 Schedule of Activities

Activities	June	July	Aug	Sept	Oct	Nov	Dec	Jan
Research and Date Gathering								
Consultation with								

Stakeholders									
Design & Production of Bins & IEC Materials									
Deployment & Project Launch									
Collection and Monitoring									
Data Analysis & Results presentation									

2.3.1 Research and Data Gathering

The Case Study Team employed three methods in gathering relevant information and research on trends and practices on cellular phone waste collection worldwide and in the Philippines, and to study possible approaches and methodologies that can be used for the case study. These methods consisted of:

- Related literature/ internet research – The case study team searched for existing studies on cellular waste collection. Most of the related literatures were found on the internet, ranging from websites of mobile phone manufacturers, take-back projects conducted by the manufacturers, government institutions or private groups, to scientific or academic research papers.
- Reconnaissance activities and meetings with malls – The CS team surveyed the identified case study areas to locate strategic locations where consumer traffic was high and investigated other possible concerns the Case Study may face, such as security.
- Consultation with groups that conducted take-back programs – The CS team also met with the organizations which have conducted their own cellular phone take back programs or are planning to conduct a similar program, namely Nokia Philippines, Inc., Globe Telecommunications Inc., and Motorola Communications Philippines Inc. to learn from their experiences and get suggestions regarding bin design, placement and campaign strategies.

2.3.2 Consultation with Stakeholders

The Case Study Team conducted a series of meetings with the various stakeholders to initially give them an overview of the project and get their inputs on the design and implementation of the case study specifically with the partners who have implemented a similar take-back program.

Nokia Philippines conducted a previous collection project in conjunction with their efforts in other countries, however while some collection bins are still deployed, the program seems to be in hiatus. Globe conducted a campaign within their office to collect cell phone waste as part of their Earth Day 2007 celebrations wherein they were able to collect a significant amount of old cell phone units for just one day of collection. Motorola Philippines on the other hand just started their take-back program early in 2007 and have installed 17 collection bins in their concept stores. This is also part

of efforts from their international office towards Extended Producer Responsibility. Samsung Electronics, Philippines likewise attempted take-back programs in their regional offices

Furthermore, the Case Study Team regularly met with the Steering Committee to give updates on the status of the project and get direction. The team made presentations during the five Technical Working Group Meetings, initially to present the general concept of the project then the detailed plan of the case study and finally to present the output of the study.

There were around 30 meetings for the period covering June to August and conducted telephone conferences for stakeholders who were very busy.

In addition to the meetings conducted by the Case Study team, the JICA Study Team met with HMR Envirocycle and the environment manager from the Nokia Regional Office in Singapore.

2.3.3 Drafting of the Memorandum of Understanding

An important process used in the Case Study was the creation of a Memorandum of Understanding (MOU), which was instrumental in binding the various stakeholders together for the project. The MOU outlined the roles of each of the partners and other venues for their involvement. The document was drafted mainly by the Steering Committee and the Case Study Team and was consulted and discussed during the TWG meetings prior to the launching of the pilot project.

2.3.4 Design and Construction of Collection Bins

The collection bin the team envisaged for case study was not only to be used as a receptacle for cellular phone waste but also as an information, education and communication (IEC) tool. It should therefore be attractive and functional.

Based on the data gathered from research and from the learnings of Technical Working Group members which have conducted cellular phone take back program, the team designed a bin which would be attractive at the same time informative. The Nokia bin was made mainly of wood, with slots for cellular phone units, batteries and accessories that also merged into one inclined chute. There were no apparent exit panels for removal of the collected items, which could not be seen owing to the material composition of the bin. The Motorola bin was constructed as an upright collapsible carton box, with an inclined surface. It had two slots leading to two separate compartments for mobile phones and the hand-held radios that the company also manufactures. Unlike the Nokia and Motorola bins, the receptacle used by Globe during its Earth Day collection program had a clear panel that showed its contents. An informative poster was placed against a foldable wooden back panel. Owing to its size however, one has to raise the top cover and bend down to deposit the discarded item (Figure 2.3-2).

As an IEC tool, the bin had an inclined top to accommodate an interactive poster. It was made of combination wood and acrylic, as suggested also by the Steering Committee and consulted partners. The clear acrylic panel allowed customer to see the collected items and became a campaign strategy. The clear panel together with the design and information on the bin poster suggests a transformation

of the cellular phone waste to recycled products as the item dropped falls to the bottom portion of the bin.

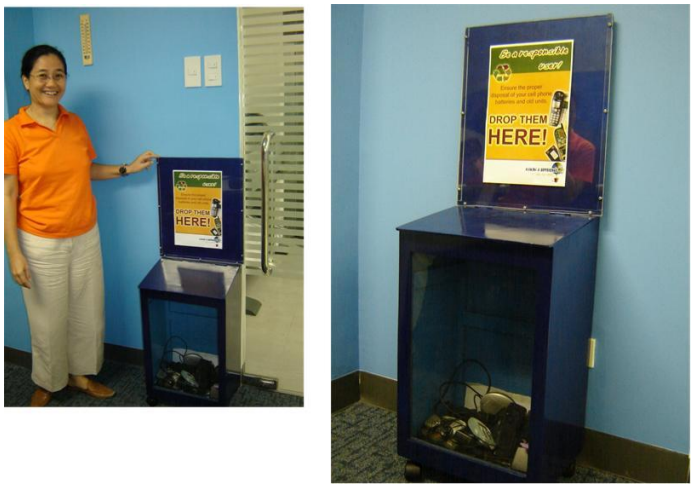


Figure 2.3-2. Bin designs of other take-back programs

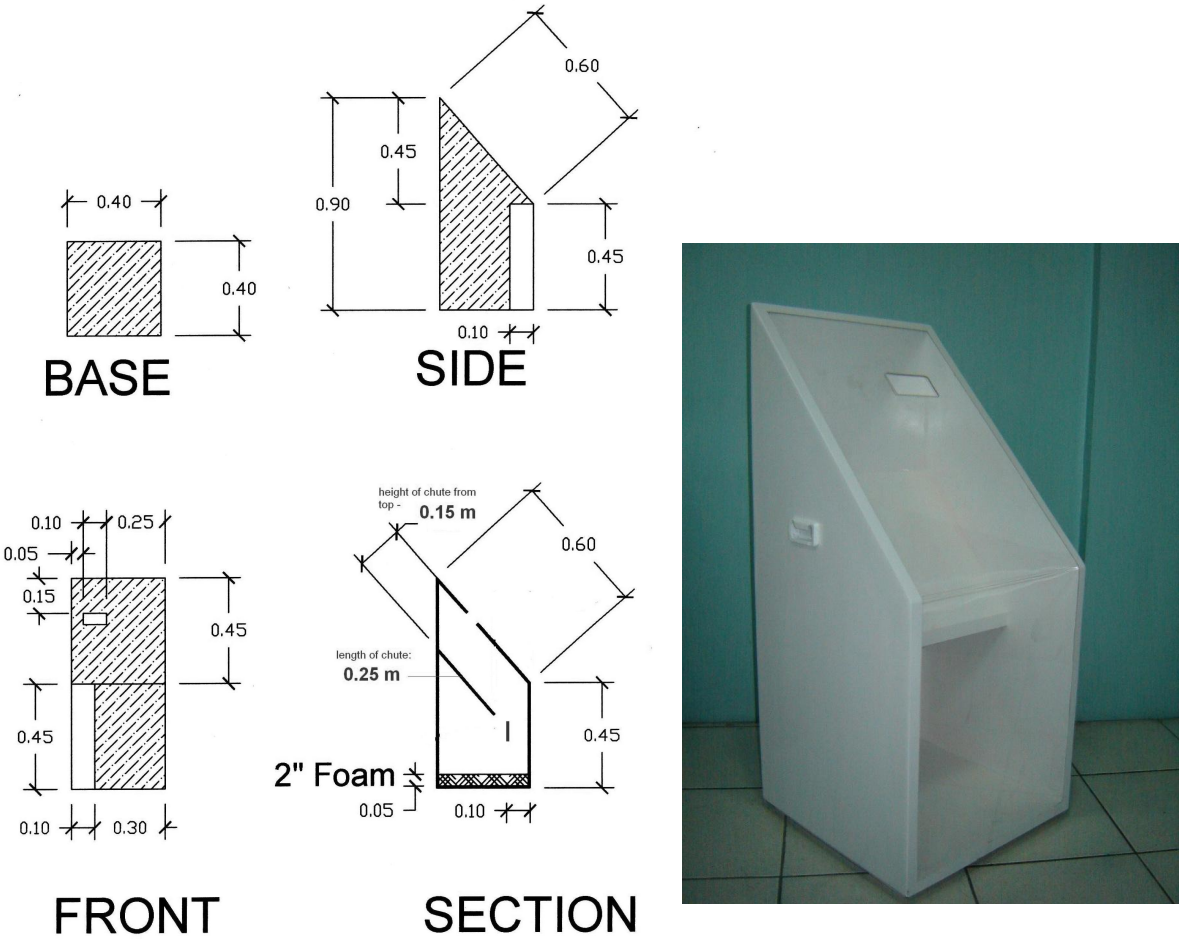


Figure 2.3-3 Bin dimensions and bare bin prototype

The base of the bin measured 0.40 by 0.40 meters, so as to cover minimal floor area and not be an obstruction to customer traffic. At its highest point it measures 0.90 meters, such that the interactive poster would still be visible while minimizing the height of the item's drop. Upon consultation with the bin fabricator, the chute could only be reasonably placed 0.15 meters from the top, allowing about 0.048 cubic meters collection capacity for each bin. Figure 5 shows the dimensions of the bin. Note that the diagram did not yet include modifications such as the right-hand slot placement, and the acrylic panels for the inclined top and front.

As a receptacle of cellular phone waste, the position of the slot considered the average level of a person's hand. The dimensions of the slot, in combination with the depth of the chute, could accommodate large analog cell phone models, but not too large to permit any possibility of pilferage. The drop of the cellular phone waste was simulated and interventions were placed to guide the drop and prevent unnecessary damage. An anti-slip mat lines the chute to retard the fall of the dropped cellular phone waste item and a wooden bar was placed to prevent the items from hitting and possibly destroying the

acrylic front panel. The foam at the bottom of the bin helps minimize the impact of the fall.

The design of the bin also considered the monitoring and collection of the cellular phone waste. The bin was pre-numbered and a guide placed in the front panel to estimate volume being collected. To facilitate the removal of contents during collection, a secured back panel door has been placed.

To make the bin look appealing, stickers of the mascot were placed all over the bin. The finishing was done by the study team as the budget for the bin was mostly spent on construction.

The 18 bins were distributed and deployed to the three malls: Glorietta and Greenbelt, Greenhills Shopping Center and SM Megamall and two to the government agencies, Board of Investment office in Makati and the Department of Environment and Natural Resources office in Quezon City.

The bin with its IEC features is illustrated in Figure 2.3-4.

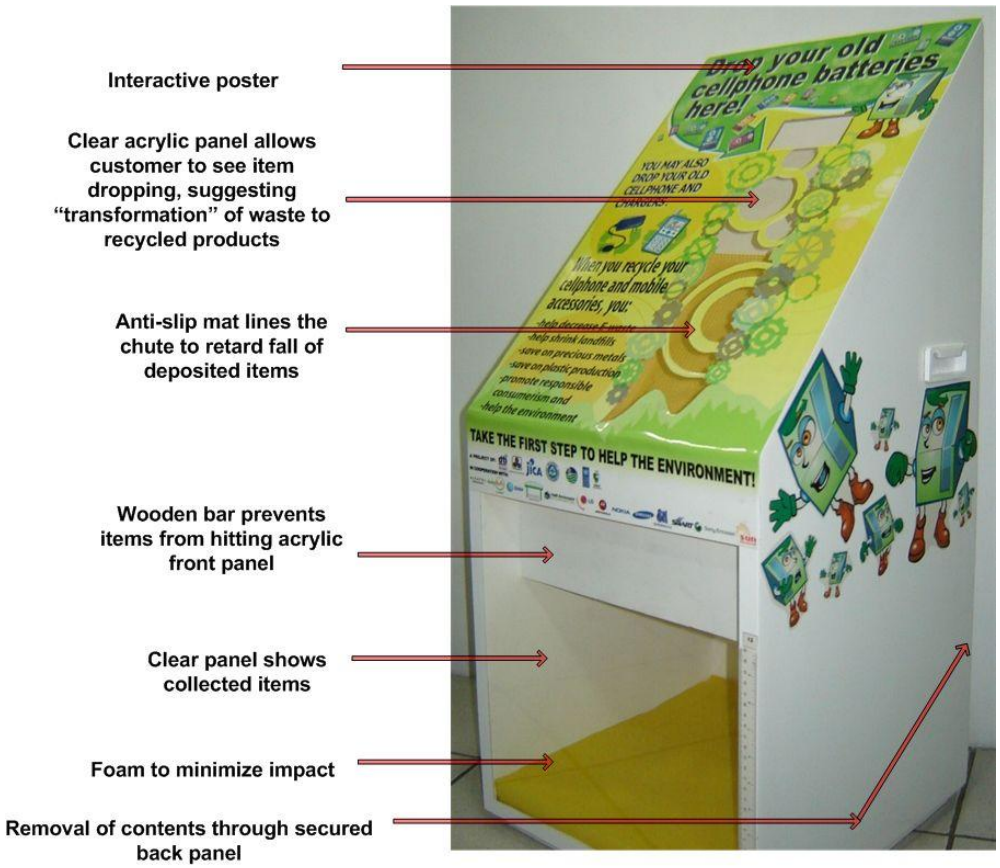


Figure 2.3-4 Cell phone waste collection bin features

2.3.5 Design of Information, Education and Communication (IEC) Materials

(1) Interactive poster on the bin

The interactive poster on the bin as an information, education and communication tool's main objective was to inform the consumer about the project and encourage them to drop their cellular phone waste. The poster needed to contain all relevant information of the project since the bins were distributed in different locations in the mall as stand-alone receptacles such that need not have auxiliary IEC materials placed beside it.

The poster contained the target items to be collected in image and text. As a consumer drops a cellular phone waste, he sees the item sliding down through the transparent acrylic panel and cut-away portions of the poster, the gears on the poster connotes the transformation of waste to recycled products. The poster also lists the benefits of recycling.

The images of cellular phone and accessories were brand neutral since the case study was a partnership of cellular phone manufacturers. The poster also wanted to communicate that it was a joint project of all major stakeholders of the cellular phone industry; hence it contained all the logos of the case study partners arranged in alphabetical order. This interactive bin poster and its features are shown as Figure 2.3-5.

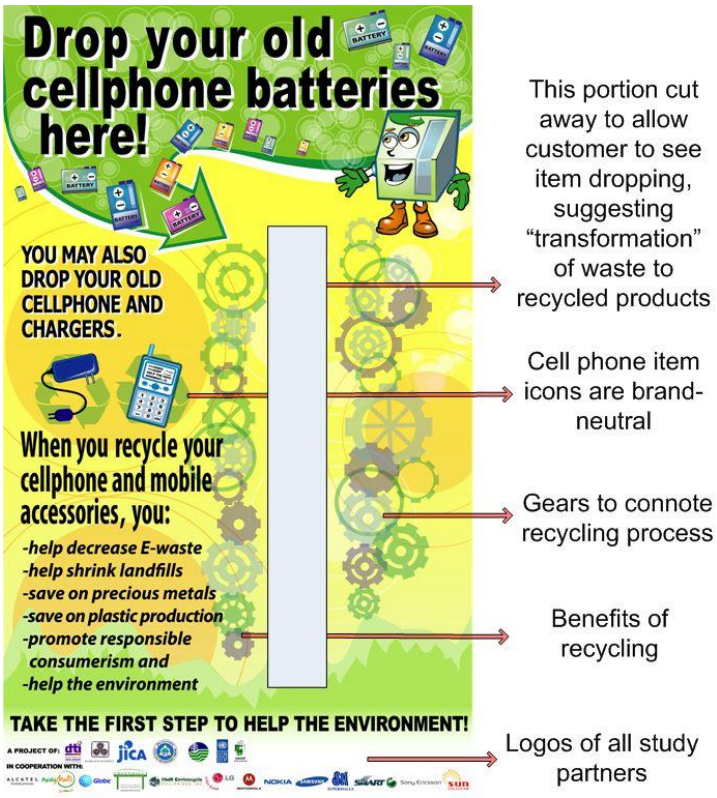


Figure 2.3-5 Interactive bin poster features

(2) Campaign Poster

The campaign poster was the main information, education and communication material of the case

study. It therefore had to communicate the objective of the case study and at the same time encourage the reader to join the case study. It was anticipated as the first point of contact of the public therefore its main objective is to appeal to their sensibilities and move them to be part of the project and drop their cellular phone waste on the bin. It consequently had to include the what, when, and where, as well as what the bin looked like (see Figure 8).

Since cellular phone batteries were the primary target collection items, the tagline of the poster became “Recycle your old cellphone batteries!” A second line, telling the consumer to “Drop your old broken & decommissioned cellphone batteries, cellphones & chargers for recycling!” accommodates the other types of waste for collection. Initially the Case Study Team suggested several catch phrases, such as “Your old cell, recycle it well!” to make it appealing to the youth, however the Technical Working Group opted for the most direct tag line. There was a conscious effort to encourage the reader of the poster to join the project and look for the bins which were located at specific malls.

Similar to the interactive poster bins, the cellular phone items are brand neutral and the logos of the all study partners were printed and arranged in alphabetical order.

Another consideration on the design was the dimension of the poster which was consulted with the mall partners, and approximated the A2 ISO 216 size, with a length of 23.64 inches and a width of 15.75 inches.

There were 600 posters printed. These were distributed to partners for posting display in their stores and offices. Posters were also deployed to other institutions such as schools and offices which were located near the three malls.



Figure 2.3-6 Campaign poster features

(3) Exhibit

The informative installation exhibit's initial objective was to set up an exhibit on cellular phone components, environmental impacts, recycling and the partners' environmental programs and corporate social responsibility activities to be displayed for a week at the malls. It was meant to put the Cellular Phone Waste Collection Pilot Project into a higher perspective. However, since this was not possible, the case study team pursued the exhibit as a compact informative installation. Upon consultation with the Technical Working Group, the installation exhibited the product life cycle of the cellular phone and accessories, its possible negative impacts when mixed with municipal waste, and the proper methods of disposal and resource recovery.

The informative installation exhibit consists of 4 panels with collection bin as part of the installation. The installation measured 0.5 meters on each side and was 6 feet high, and was composed of tarpaulin posters attached to a wooden frame (Figure 2.3-7).

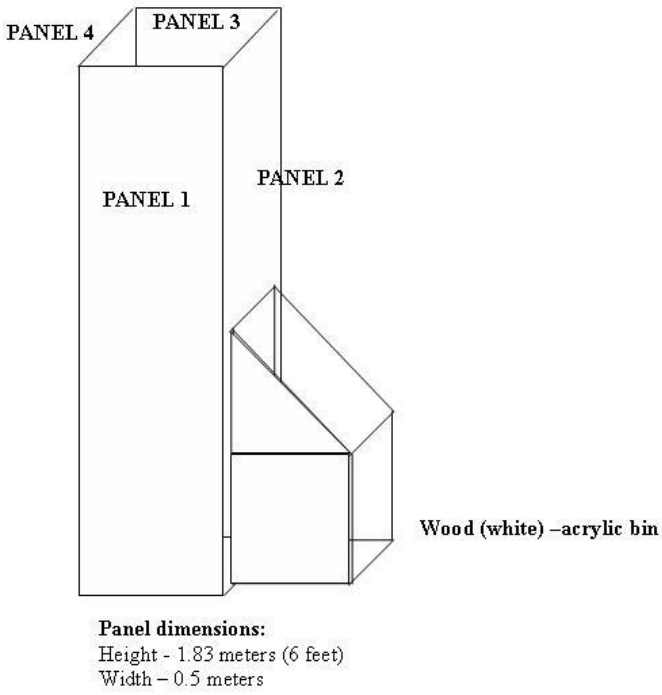


Figure 2.3-7 Informative installation set up and dimensions

Panel 1 shows the increasing number of cellular phone usage in the developing countries and cellular phone users in the Philippines. Panel 2 where the bin is attached is a decision tree showing the advantages of recycling cellular phones, the end products as against throwing of cellular phone waste as regular trash. Panel 3 details the composition of cellular phones as a complete package or by component, i.e. cellular phone unit, battery and charger, while Panel 4 features the life cycle of

a cellular phone. The underlying rationale of the exhibit is the importance of increased consumer knowledge and understanding for a successful campaign. The contents of the four panels are shown in Figure 2.3-7.

The exhibit was deployed to the three malls the week of September 20. Greenhills Shopping Center displayed the exhibit at the Cell Phone *Tiangge* Area and SM Megamall at the Cyberzone Area in the 4th floor for the entire duration of the project.

Note that all IEC materials and the bin had the logos of all project partners.

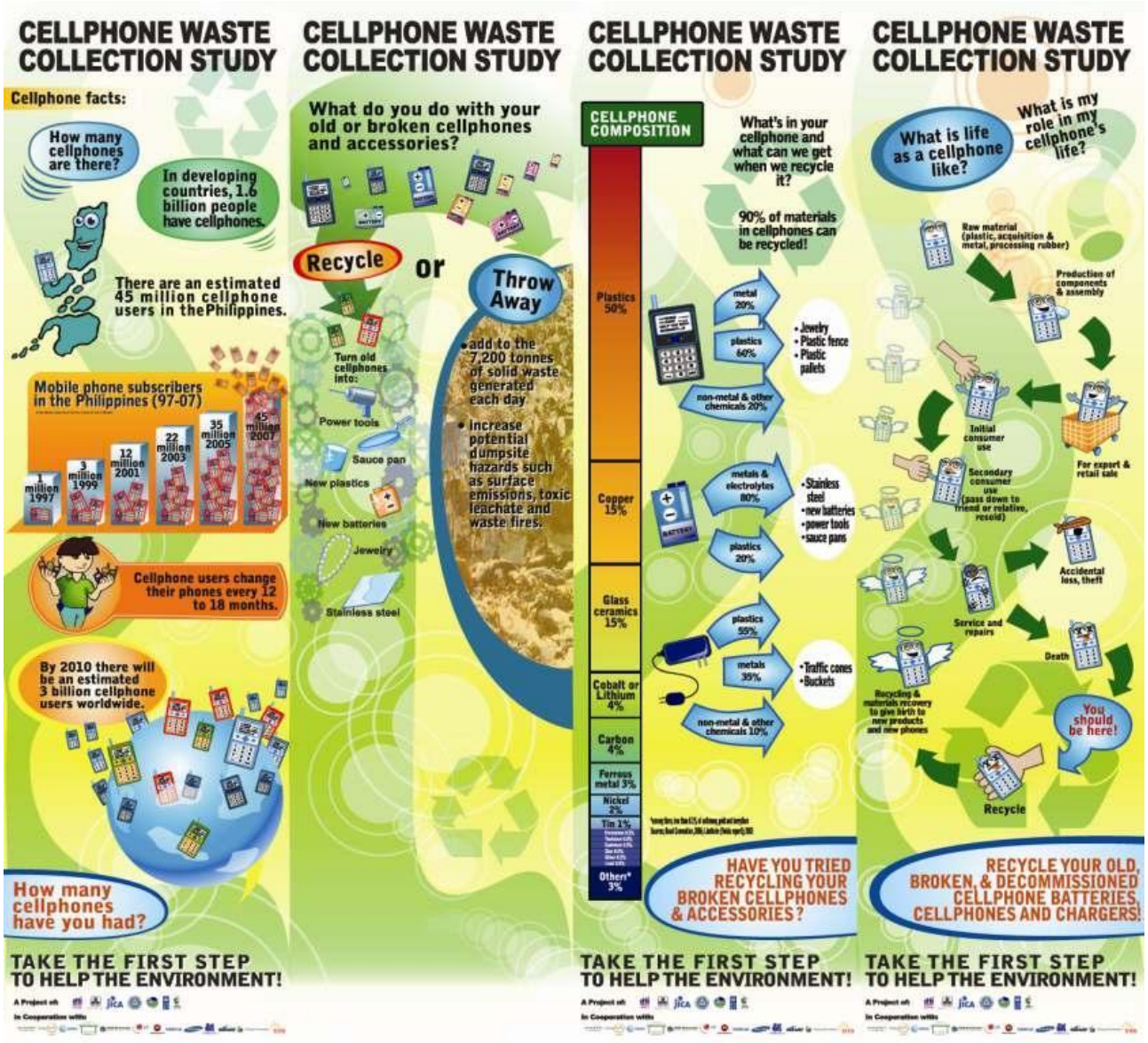


Figure 2.3-8 Contents of Informative installation , Panels 1-4

(4) Seminar

The Case Study Team as part of the Cell phone Waste Collection Study planned to hold two types of Information, Education and Communication Sessions at the Greenhills Shopping Center, one for the tenants and the other for the technicians. Of the three sites, Greenhills has the highest concentration of cell phone retain and repair shops, which number around 750 during the peak season. These sessions aim to inform Greenhills tenants and technicians of the ongoing study on Cell phone Waste Collection with the end goal of making them understand the study and hopefully encourage them to be active stakeholders not only in the study but in the Cell Phone Waste Collection and Recycling Process.

Although, the primary target of the project are the direct consumers or the population that purchase cell phones, we consider the tenants and technicians as critical partners because they deal with the direct consumers and their main products are cell phones.

However the said seminars did not push through due to the busy schedule of the tenants who were preparing for the holiday season. The team has turned over the materials to Greenhills Shopping Center in the event that they decide to conduct the seminar themselves.

2.3.6 Launching and Campaign Proper

The project was launched on September 14, 2007 at the Dusit Hotel through the signing of the Memorandum of Understanding between all the stakeholders. All the partners were present and the event was covered by several broadsheets and government media agencies.

The posters and the bins were distributed before the launch and the partners were allowed to post and deploy the posters and bin on the day of the launch. Table 2.3-2 lists the types of areas these bins were placed and their distribution across the study sites, while Figure 2.3-9gives the spread of the sites across Metro Manila and the maps of their locations in the malls.

Table 2.3-2 Types of locations of bin distribution

Type of Location	Glorietta-Greenbelt	Greenhills	SM Megamall	DTI-BOI	DENR	Totals
Entrances/ Exits	3		3			6
Main Lobby				1	1	2
Corridors and activity areas	2	1				3
Cell phone shop areas/ technology hubs	1	3	1			5
Network Service Providers Service Centers		2	2			4
Totals	6	6	6	1	1	20



Figure 2.3-9 Project sites and location maps of bins in the malls

2.3.7 Monitoring and Collection

Collection of cellular phone waste started on the launch date, September 14, 2007 and ran until January 9, 2008, which completed a 4-month collection period.

During this four month collection and monitoring period, the case study team visited each of the bins on a weekly basis and documented the number of cellular phone waste categorized by type:

- whole units or major parts thereof
- plastic housings,
- cell phone batteries,
- chargers,
- accessories, and

- miscellaneous items such as CDs, leather casings, watches, zinc-carbon batteries, and others.

On a monthly basis, the case study team sorted and weighed the consolidated cellular phone waste at the mall level according to type. Batteries were further sorted according to the following types:

- Lithium ion (Li-ion)
- Lithium polymer (Li-polymer)
- Nickel Metal Hydride (Ni-MH)
- Nickel Cadmium (Ni-Cd)
- Lithium Nickel Hydride (Li-NH) and
- unknown batteries such as those with missing or unreadable labels

Cell phone waste types and the different battery were stored separately in plastic bags after weighing. Old units were ensured to be devoid of their batteries, and battery terminals were taped to prevent unwanted reactions and short circuiting.

The cellular phone waste are gathered and stored in a temporary facility on a per need basis. For malls which had high volume like Greenhills Shopping Center, the gathering and storing in the temporary storage area provided by Greenhills Shopping Center. For Glorietta-Greenbelt and SM Megamall, the cellular phone waste were gathered and stored temporarily at the SAGIP-Environment Office. Figure 12 outlines the monitoring and collection protocol used in the case study.

For the whole duration of the case study, the cellular phone waste collected was transported and stored in Laguna Facility HMR Envirocycle in three separate trips.

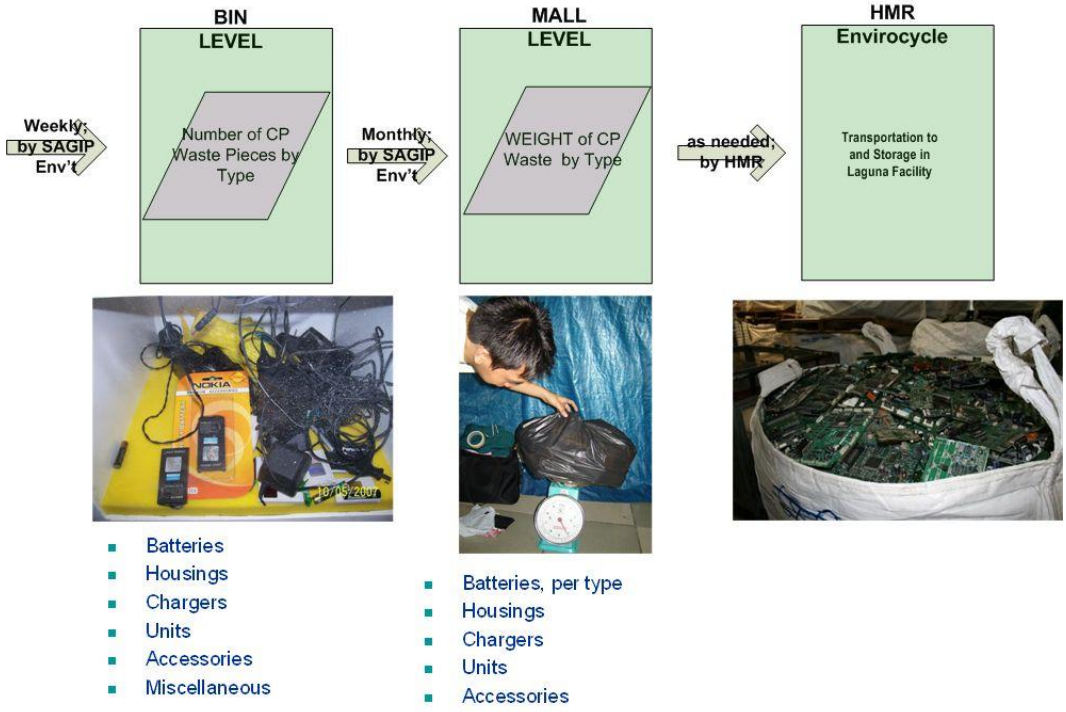


Figure 2.3-10. Monitoring and Collection Protocol

2.4 Outcomes and Analyses

2.4.1 Collection Data and Results

The collection data were processed and analyzed using seven iterations:

- Collection volume per bin location, in number of pieces
- Total collection volume across sites, in number of pieces and weight
- Collection rate per site, in number of pieces
- Collection trends in the malls
- Cell phone waste distribution per site, in number of pieces
- Distribution of CP waste types in number of pieces and weight
- Distribution of battery types per site and per type, by weight

These iterations give insights on consumer participation and behavior, collection rates and trends, and the nature of waste collected.

(1) Collection volumes

1) Collection volumes per bin location

The amounts of collected waste vary across the different types of bin locations in the malls, as shown in Figure 2.4-1A-C. The most collected waste in across all of the sites was predictably the Cell Phone "*Tiangge*" or "flee market" in the second floor of the Greenhills Shopping Center main building (Figure 2.4-1B). This is where almost all the cell phone retail and repair stalls are located.

These stalls, numbering almost 750 during peak season, could be as small as 1.2 x 1.2 meters in floor area. During monitoring activities, it was discovered that the high collected volumes in these areas are not mainly due to customer or stall tenant participation, but were instead due to the janitors who would deposit e-waste accumulated from the stalls. These wastes are sometimes given by the stalls but more often than not these were still coming from mixed waste receptacles.

The collected volumes outside the Greenhills Cell Phone *Tiangge* area and those from other study sites would be more reflective of public participation to the project. For Glorietta-Greenbelt, highest participation was noted in the Activity Center (Figure 2.4-1A) while in SM Megamall, the entrances/exits and the Cyberzone bin yielded the highest collection (Figure 2.4-1C).

2) Total collection volumes across sites

Greenhills Shopping Center contributed the highest collection in terms of pieces and weight, comprising 82% and 62% respectively (Figure 2.4-2A-B).

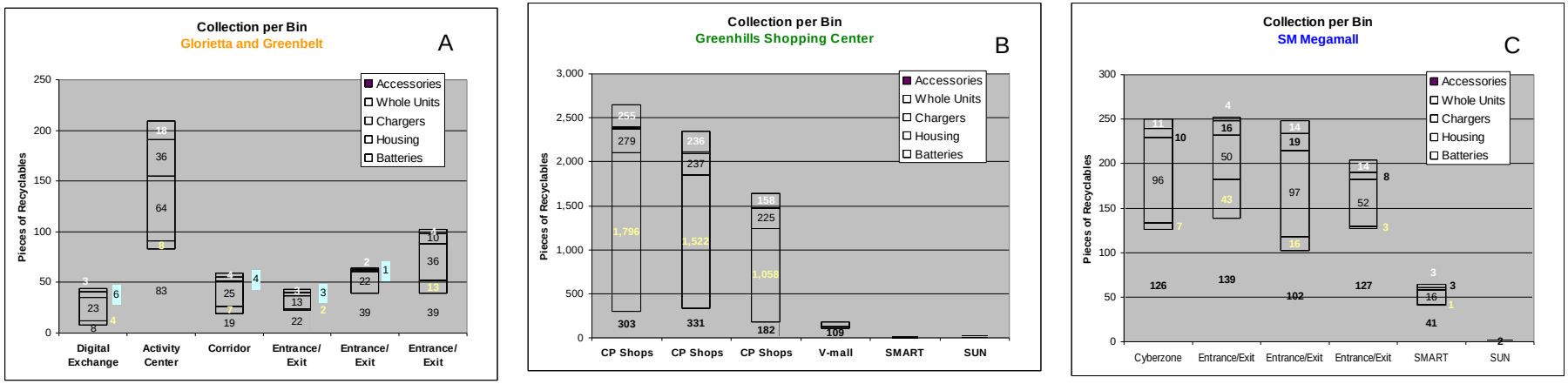
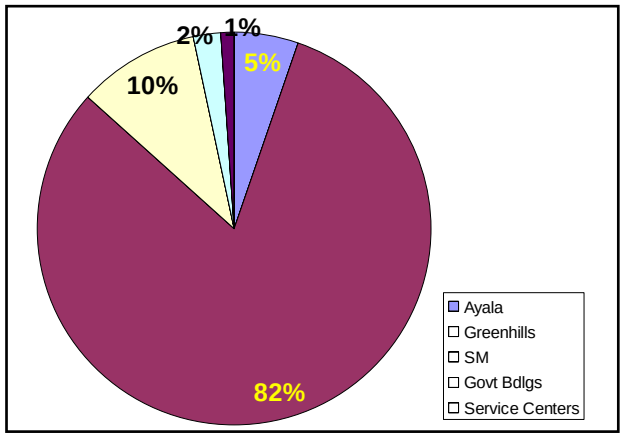


Figure 2.4-1 Collection volume per bin location



A:

Collection per Piece

B:

Collection by Weight (kg)

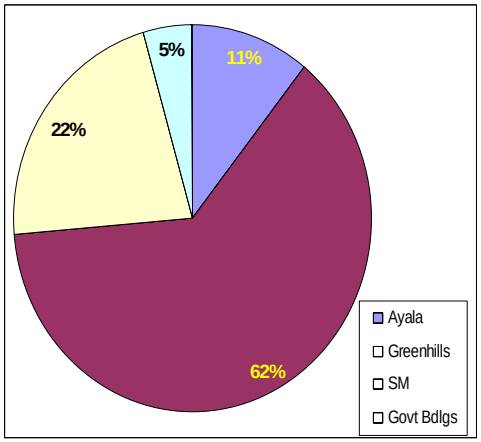


Figure 2.4-2 Total collection volume across sites

(2) Collection rates and trends

1) Collection rates per site

Figure 2.4-3A-F show the collection rates for each of the case study sites across the four month collection period. Running totals are kept during the weekly monitoring, however, after retrieval each month, counting starts from zero.

Figure 2.3-3A shows that there was an upsurge in collection during the last two months for Glorietta and Greenbelt, which coincided with the holiday season. Presumably during this time there are more visitors who frequent the malls, and more participants who dispose of their old cell phone units and accessories possibly due to future purchases of newer models.

There were high collection rates for the first two months at the Greenhills Shopping Center (Figure 2.3-3B) due to the cellular phone waste accumulated months before the case study started. It may be surmised the collection rate for months 3 and 4 are the normal monthly volume. Note that the number of collected items from Greenhills reached close to three thousand pieces in both months 1 and 2. The graphs cover only 4 bins, excluding the two bins located with the Network Service Provider Shops within the complex.

The collection rate at SM Megamall, was relatively constant throughout the four month study (Figure 2.3-3c). Similar to the Greenhills graph, this excludes the two bins located in the NSP shops.

No trend can be established for the Sun Shops and Smart Wireless Centers (Figure 2.3-3D), while the collection for the first months in the two government agencies was high (Figure 2.3-3E-F). It may be surmised that these service shops and government agencies have visitors who do not frequent these locations, and while they may have seen the collection bins during one visit, they may not have succeeding appointments for them to drop by and deposit their cell phone waste.

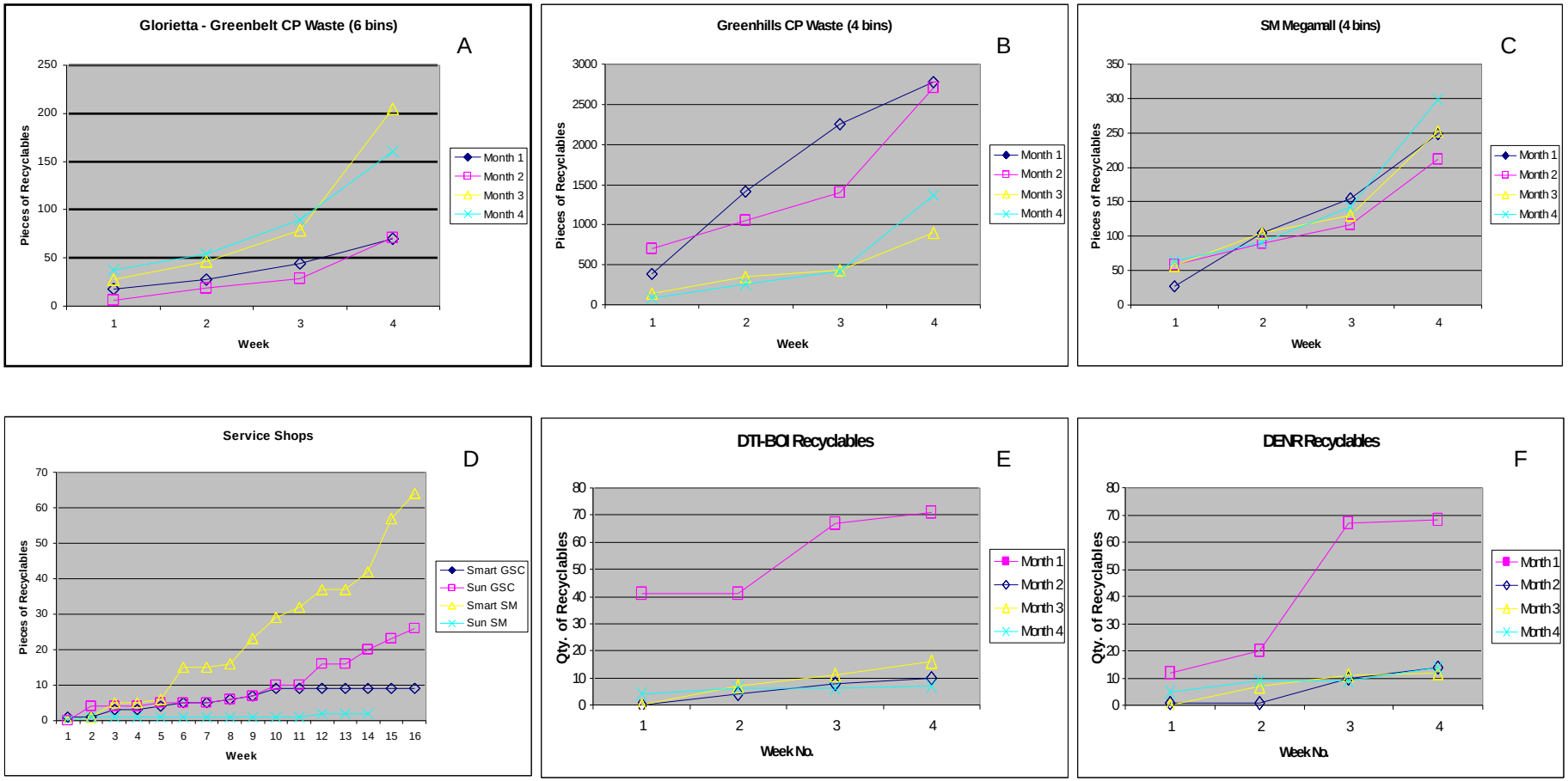


Figure 2.4-3 Collection Rates (# of pieces) per site

2) Collection patterns in the malls

Participation was noticed to have an oscillating pattern throughout the collection period (Figure 2.3-4A-C). Collection rates are notably high during the first week, when the bins have just been emptied of their contents. Participation dips during the middle of the month, but accelerates after the third week, when the bins are becoming full. Note also that in the first month, participation did not take off until the second week, attributing to a gestation period in terms of public awareness.

This shows that visual access to the contents of the bin is an important feature that piques the curiosity of passers-by and entices them to participate.

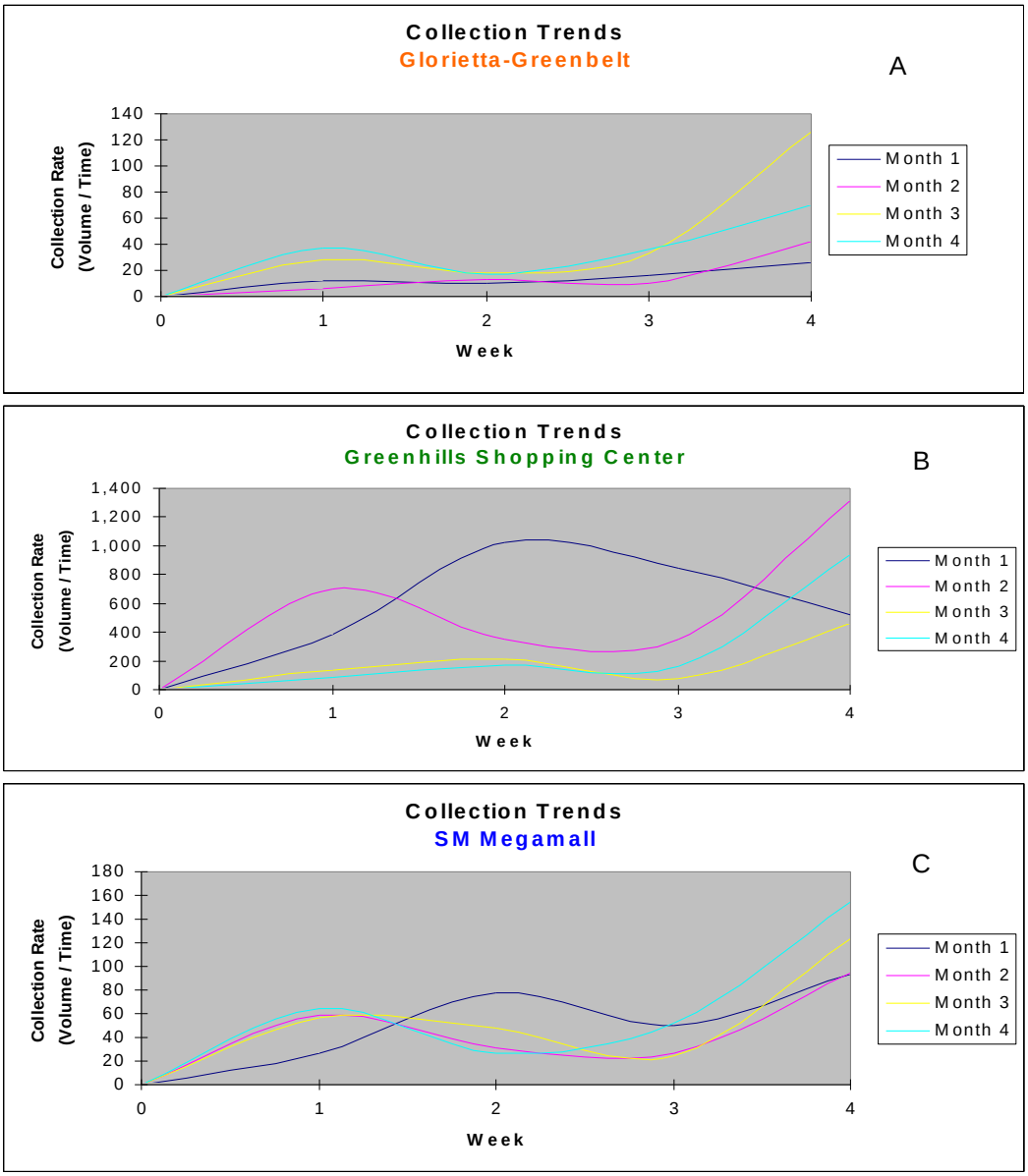


Figure 2.4-4 Collection patterns in malls

(3) Collected cell phone waste types

1) CP waste types per site

Chargers and batteries comprise the larger percentages of collection in Glorietta and Greenbelt, SM Megamall and the government agencies, however, plastic casings that were mostly obtained

from the Greenhills bins comprised most of the collected waste in terms of number of pieces (Figure 2.3-5A-E).

2) CP waste types distribution of total collected volume

A total of 9,514 pieces of cell phone waste were collected during the 4-month study period. In terms of number of pieces, plastic housings comprised more than half of the volume (53%), indicating that these have the highest turnover and disposal rate (Figure 2.3-6A). Consumers would often change the look of their cell phones by purchasing decorative housings.

In terms of weight, total collected volume amounted to 280.75 kilograms. Chargers constituted the highest percentage in terms of weight (40%), followed by batteries, as shown in Figure 2.3-6B. The volume in terms of weight is significant for recyclables trade or disposal of these items since market prices use this unit of measure. Hence the chargers may be bringing in the most significant value, but at the same time this could be offset by the disposal cost of the batteries which also registered a significant percentage of total weight.

3) CP battery distribution per site and per type

More than half of the batteries were recovered from the Greenhills Shopping Center, while 27% were recovered from SM Megamall (Figure 2.3-7A). In terms of the battery types obtained, 58% were lithium based (Li-ion or Lipolymer), while nickel metal hydride (Ni-MH) batteries comprised 31%. Nickel cadmium (Ni-Cd) batteries, considered to be the most hazardous, contributed 8% by weight of the total batteries. Half of the Ni-Cd were obtained from SM Megamall. Other batteries were of the more rare Li-NH type, while around 3% were unidentifiable (Figure 2.3-7B).

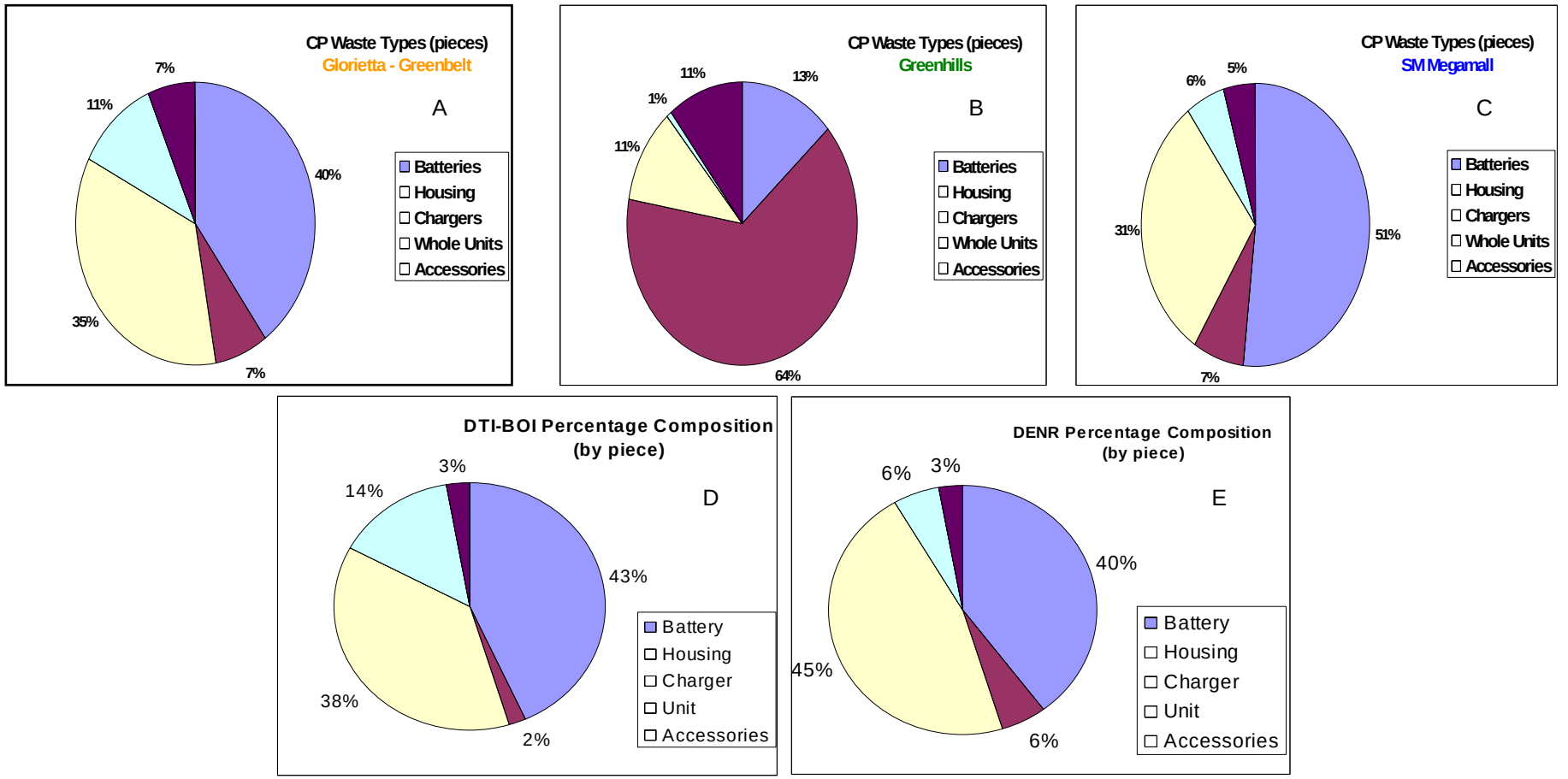
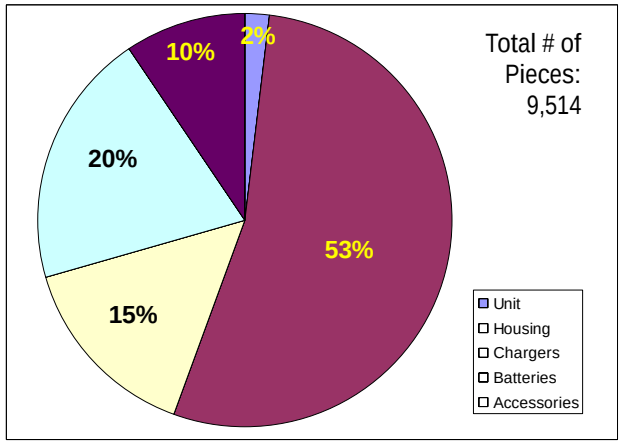


Figure 2.4-5 Cell phone waste types per site



A:

Collection per Piece

B:

Collection by Weight (kg)

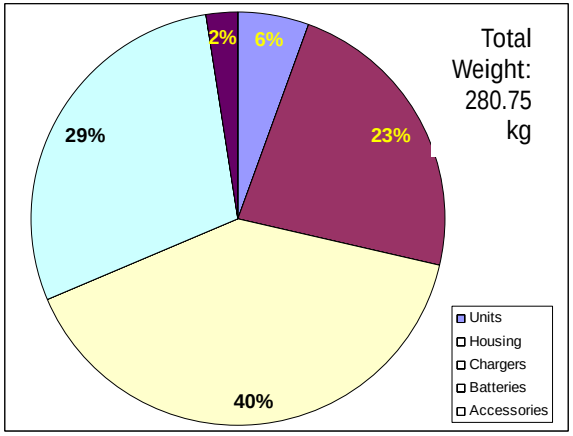
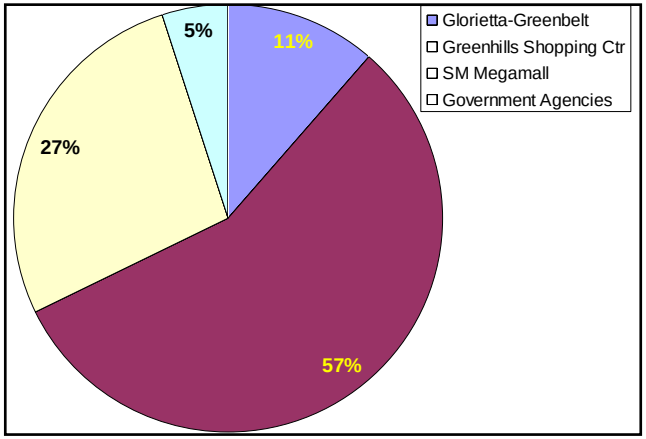


Figure 2.4-6 Cell phone waste type distribution



A:

Distribution per site

B:

Distribution per battery type

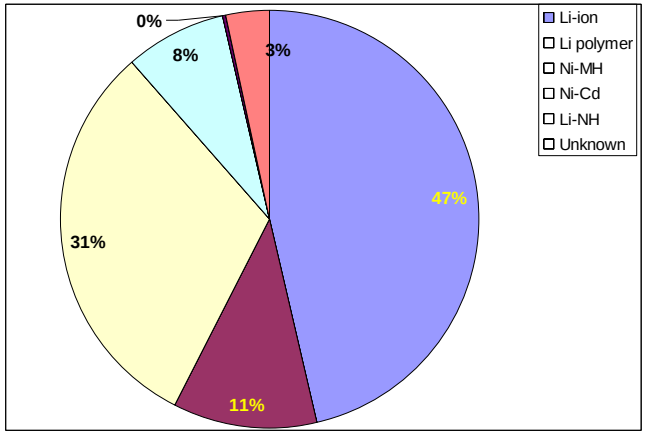


Figure 2.4-7 CP Battery distribution

2.4.2 Rates, Values and Costs

(1) General collection rates

General collection rates for each type of cell phone waste were computed over the 16-week period. Table 2.4-1 presents the amount of each type in terms of pieces and weight, as well as the monthly rates of collection. Considering collection rates at the current levels of effort, it would take 14 years to fill up one container van of mixed cell phone waste for possible exportation and treatment. Efforts therefore have to be increased at least ten-fold in terms of geographic distribution, number of bins, and publicity.

Table 2.4-1 Collection rates per CP waste type

Cell Phone Waste collected per Type	Collection Volume		Monthly Rate	
	# pcs	wt in kg	pcs/ month	kg/month
CP Units	189	15.80	47.25	3.95
Housing	5,090	64.45	1,272.50	16.11
Chargers	1,440	112.60	360.00	28.15
Batteries	1,891	80.95	472.75	20.24
Accessories	904	6.95	226.00	1.74
All cell phone waste collected	9,514	280.75	2,378.50	70.19
Collection Period for 12 tonnes (one container van)				14 years

(2) Value of collected waste

The potential value of the collected waste was computed at two levels: the immediate value of the waste sold as electronic and plastic scrap, and the potential added value if the cell phone units obtained will be dismantled to recover recyclable parts.

Table 2.4-2 summarizes the values that could be obtained from the collected waste during the case study. Current market prices were obtained from estimations given by HMR Envirocycle. Note that based on both market price and volume collected, chargers gave the highest value among the different types of CP waste. Continued inclusion of other types of CP waste with recoverable materials of high value, such as the copper wires from chargers, add to the sustainability of the collection program.

Calculations on post-dismantling value were based on average percentage compositions by weight of each cell phone component. These percentage compositions were based on data obtained from HMR Envirocycle on the mass of the cell phone components vis-à-vis the total mass of the phone. The total weights of each component were then computed based on the 189 phones amassed during the study period. Note that these are theoretical values and were not based on actual weighing. Computations are presented in

Table 2.4-3.

Table 2.4-2 Potential value of CP waste collected

Parameter	CP Units and Parts					Totals
	Phones	Housing	Chargers	Batteries	Accessories	
Amount of collected waste (kg)	15.8	64.45	112.6	80.95	6.95	280.75
Buying Price per weight (PhP/ kg)	2.50	3.00	8.00		2.50	
Immediate Value of Collected Waste (PhP)	39.5	193.35	900.80	0	17.375	**1,151.03**
Potential Post-dismantling value (PhP)	based on materials that could be derived after cell phone unit dismantling using % by weight compositions from HMR Envirocycle					**795.04**
Total Value of Collected CP Waste (PhP)						**1,946.06**

Table 2.4-3 Potential post-dismantling value of CP units collected

Cell Phone Components	Percentage Composition	Average Mass per Unit	value/ wt	Collected weight From 189 units	Collected Value
Unit of Measure	(kg part/kg unit)	**kg/ phone**	**PhP/kg**	**kg**	**PhP**
Plastic	0.2966	0.0248	3.00	4.6859	14.05779
Keypad	0.0505	0.0042		0.7986	
Rubber	0.0092	0.0008		0.1459	
Screw	0.0097	0.0008	4.00	0.1540	0.615973
Speaker	0.0154	0.0013	2.50	0.2430	0.607591
Metal	0.0139	0.0012	4.00	0.2190	0.875848
Printed wiring board (PWB)	0.2465	0.0206	200.00	3.8944	778.8825
Liquid Crystal display (LCD)	0.0318	0.0027		0.5031	
Battery	0.5058	0.0423		7.9921	
Total					**795.0397**

Table 2.4-4 Potential dismantling and disposal cost of CP waste collected

Parameter	Price	Unit	Collected Amt	Subtotal
dismantling cost (labor)	3.39	per phone	189 phones	639.84
treatment/ disposal cost: LCD from units to be dismantled	22.50	per kilo	0.50 kg	11.32
treatment/ disposal cost: batteries	22.50	per kilo	80.95 kg	1,821.38
Potential Cost of Disposal (CP Waste from Case Study)				**2,472.54**
Total Value of Recyclables (CP Waste from Case Study)				1,946.06
Net Value				**-526.47**

Table 2.4-5 Cost of publicity, collection, monitoring and transportation

Parameter	Price	Unit	Qty	Subtotal
Campaign posters cost	70.72	per pc	600	42,430.00
Exhibit installation cost	2,790.00	per pc	3	8,370.00
Collection bin cost	5,012.00	per pc	20	100,240.00
Monitoring cost (labor)	682.00	per man-day	56	38,192.00
Transportation cost	1,800.00	per round trip	3	5,400.00
Total Cost of Collection Efforts under the Case Study				**194,632.00**

(3) Cost of dismantling and disposal

The potential cost of dismantling and disposal were based on several assumptions:

- A skilled laborer with the proper equipment could dismantle one cell phone unit in five minutes;
- Minimum wage is set at PhP 325/ day;
- Disposal costs for LCDs and batteries would be PhP 22.50/ kilo;
- The amount of LCDs to be disposed are based on theoretical post-dismantling weights;
- The amount of batteries to be disposed are based on actual collected weights during the 4-month study.

Table 2.4-4 shows the computations for potential expenses and compares it against the potential value that could be obtained from the recovery of recyclables from the collected scrap. The costs for dismantling and disposal are higher than the expected market value of the cell phone waste collected

by around PhP 500. This difference is manageable and could be compensated by longer periods of collection, and increasing collection of high-value CP waste such as cell phone units and chargers. Furthermore, the value of the collected CP waste was only based on the market value of recoverable recyclables. This did not yet consider the value of ecological and potential health benefits of proper disposal and waste diversion, which when taken into account, would greatly outweigh the incurred cost of disposal.

(4) Cost of case study execution

Capital outlay, such as the costs of IEC materials and bin production, as well as monitoring and transportation costs, are summarized in Table 2.4-5. Of these expenditures, the most significant cost was the production of the bin. Note that this amount did not include other expenditures such as:

- Cost of meetings and coordination;
- Cost of pilot project launching ceremonies;
- Final prepping of the bin (printing and mounting of the interactive poster and stickers, costs of anti-slip mats, foams and keys); and
- Transportation costs for bin and informative installation deployment.

While capital outlay may seem costly, it must be considered that this case study was an investment towards establishing baseline data and public receptiveness to such a collection scheme towards policy formulation and fine-tuning for future programs. Given the small scale, bin fabrication and poster printing costs have higher unit prices. For succeeding collection programs, costs for collection, monitoring and transportation could be decreased by:

- Ordering collection bins in larger bulk numbers to decrease unit cost by about 10%;
- Limiting data gathering activities to monthly sorting and weighing which does not need technical expertise, thereby reducing professional fees and number of man-days;
- Providing sufficient storage space at the mall level to maximize vehicle's 4-tonne capacity and to reduce number of trips by HMR Envirocycle;
- Coinciding pull-out of cell phone waste during Waste Markets held at the malls with HMR Envirocycle as participating recycler; and
- Increasing counterparts from the Cell Phone Industry such as involvement in publicity campaigns

2.5 Conclusions and Recommendations

2.5.1 Achievements and Lessons Learned

(1) Accomplishments vis-à-vis general objectives

This Cell Phone Waste Collection Case Study has proven that of cell phone waste through drop-off points in commercial areas is a feasible and worthwhile endeavor. Public response has been positive and indicated increased awareness on recycling and proper disposal of electronic waste.

While there were no direct methods to measure public awareness, the volume of accumulated cell phone waste and collection rates became the indirect measures of consumer participation. There were plans of conducting surveys and interviews with individuals who would deposit their CP waste, but this did not materialize due to manpower and logistic constraints.

This Case Study led to several milestones towards addressing the problem of increasing cell phone waste:

- It established baseline public participation and collection rates given minimal interventions;
- It developed IEC materials and a blueprint for bins that entice participation without sacrificing functionality;
- It devised and tested a monitoring and collection protocol for cell phone waste;
- It provided preliminary values and costs to be considered towards program sustainability; and
- It showed that a joint collection program by the government and the private sector, composed of stakeholders within the highly competitive communications industry, is possible.

(2) Bin design, location and maintenance

The design of the bin could be improved by taking into consideration the weak points observed during collection. The opening size may have to be increased to accommodate bulk deposits, such as batteries wrapped in plastic. Reinforcement of the opening, which was made of acrylic, may be done by substituting the inclined top with wood, with a small acrylic panel if interactive poster would be retained.

Since the bin and its contents serve as an IEC material in itself, maintaining its cleanliness cannot be over-emphasized. Miscellaneous trash such as paper or food wrappers deposited in these bins should be constantly removed, since these allow others to use it as a trash bin. In conjunction to this, bins should not be placed near food stalls, kiosks selling prepaid cards, or sales representatives giving away fliers.

(3) Establishments with high concentration of cell phone shops

IEC activities for cell phone retailers and repair technicians should be a pursued in future collection projects. Considering that majority of the gathered waste were sourced from these shops but were deposited by mall maintenance crew, true segregation at source would entail the formers' active participation.

A different approach may be necessary for establishments with high concentrations of retail and repair shops. The interventions by mall management with respect to involvement of maintenance crew could be extended to their tenants through, for instance, requisite seminars on waste management prior to providing or renewing leases. Collection protocols and standard operating procedures for e-waste management should be in place for stalls and maintenance crew. In this context, bins would have to be redesigned to have larger capacities, and the interactive features to attract passers-by (i.e. the poster, chute, and acrylic panels), would not be necessary.

2.5.2 Project Continuity

During the last Technical Working Group meeting, it was agreed upon that cell phone waste collection will continue after this case study, spearheaded by the participating malls in coordination with HMR Envirocycle. This will cover the same types of cell phone wastes, since sustainability would be dependent on recoverable recyclables to offset disposal of batteries. It will now include other branches, increasing the geographic coverage to include northern and southern Metro Manila, where residential areas are concentrated.

The cell phone and telecommunications industry players will continuously be involved through an ad-hoc committee that will meet regularly with the Steering Committee, which will still be chaired by DTI-BOI, for policy discussions and possible formation of a recycling association for cell phone waste, similar to existing associations for traditional recyclables such as paper, plastics, metal and glass. Current take-back programs will be continued and collection data would be accessible to the committee.

2.5.3 Recommendations and Future Challenges

(1) Insights for policy

Increased involvement of the cell phone manufacturers in addressing the waste produced by the industry would be an ideal approach consistent with the Extended Producer Responsibility (EPR) principle. While there are a few take-back programs being conducted by individual manufacturers locally in consolidation with international corporate social responsibility policies, the impact of these programs is still to be felt.

A major difficulty in tackling proper cell phone waste disposal would be the inclusion of so-called "gray" items, such as generic/ competition/imitation cell phone units, batteries, chargers and accessories, which dominate the market. Major manufacturers cannot be held responsible for products that do not carry their legitimate brand name. This would be where government and an industry-based recycling committee should step in. The Case Study Team believes that the

Network Service Providers should also be tapped, since while consumers may not necessarily purchase cell phone items of any major manufacturer, they are definitely subscribers of one of the three Networks. They are also Filipino-owned or Philippine-based corporations, which would facilitate decision making and program implementation.

The formation of an industry-based recycling association would admittedly take time and possibly a policy push to be realized. Firstly, local definitions and criteria of electronic waste with respect to hazardous and special waste have to be spelled out. Mechanics of collection, operational cost sharing, and disposal protocols would have to be established and agreed upon by the members. Different collection strategies, from regulatory, mandatory to voluntary approaches, should also be explored. As mentioned previously, there may be a need to develop guidelines for commercial establishments with a high number of cell phone shops, or electronic shops for that matter, to handle the e-waste generated.

2.5.4 Expanding publicity efforts

The reach of the publicity materials in the case study was limited mainly to customers who frequent the malls where the bins were deployed. Connecting with the waste generators at the household level could be achieved by print and broadcast media, capitalizing on the momentum established by the pilot project. Adequate funds should be allocated for these publicity efforts, with possible financial support from Industry. Other untapped resources and strategies could be explored; for instance marketing events such as concerts, product launches and promotions could be used as venues for cell phone waste collection programs.

2.5.5 Research on cell phone waste composition

Much information can still be obtained from the cell phone waste collected under this case study. The CP waste could be sorted further in terms of original vs. imitation batteries or units, and the identification of the chemical make-up of these imitation batteries. Items could also be profiled according to brand, make or material type. Old cell phone units could also be dismantled to study their components and material composition. Further studies in this direction would provide technical teeth to policy formulation.

3. Case Study III

3.1 PILOT PROJECT ON MOBILE PLASTIC COLLECTION AND RECYCLING

3.1.1 Background of the Project

The Study on Recycling Industry Development in the Philippines, which the Department of Trade and Industry, through the Board of Investments, is undertaking with technical assistance from the Japan International Cooperation Agency (JICA) aims to formulate a Master Plan and Action Plan to develop the Philippine recycling industry in line with Republic Act 9003 or the Ecological Solid Waste Management Act of 2000.

In line with the Study, the JICA Study Team and DTI-BOI, in coordination with relevant government agencies and the private sector, identified pilot projects to test the viability of recycling guidelines for plastics, paper, glass bottles, metals and electronic wastes as well as prepare Information and Education Campaign (IEC) materials to promote awareness on recycling.

The Philippine Plastics Industry Association, Inc. (PPIA), a non-stock, non-profit industry association, with office address at 122 A. Del Mundo St., between 10th and 11th Avenues, Grace Park, Caloocan City, was engaged by Japan International Cooperation Agency (JICA), through EX Corporation, on 29 June 2007 to implement a six-month pilot project entitled “Mobile Plastic Collection and Recycling”.

3.1.2 Project Objectives

The objective of this project is to enhance the recycling rate of plastics with focus on “plastic bags” through a mobile plastic collection and recycling approach and establish a mechanism for operational sustainability.

3.1.3 Project Concept

(1) With the emergence of recyclers of post-consumer plastic bags and films, there is a need to link up the generators of scrap plastics especially post-consumer plastic bags with the recyclers to develop a recycling market and to significantly reduce the volume of residual wastes.

(2) The Mobile Plastic Collection/ Recycling Project will serve as a showcase of the present capabilities for recycling plastic scraps and to increase awareness on the proper handling of waste plastics as prescribed in the Recycling Guidelines to increase their recovery and recycling.

(3) The project involves the lease of a modified truck equipped with:

- Plastic Melting Oven and Grinder for processing on-site the plastic sando bags and PS scrap (only when collected recyclables are contaminated)



Figure 3.1-1 Mobile Plastic Recycling Truck

- Bins for carrying plastic recyclables and to serve as visual aids for barangays, households and schools that such plastic types are being collected and recycled. The bins are segregated into:

  1) Polyethylene Terepthalate (PET)
  2) Polyethylene Rigids (PE Rigids)
  3) Polyethylene Flexibles (PE Flexibles)
  4) Polypropylene (PP)

5) Polystyrene (Foam PS, EPS)



Figure 3.1-2 Segregation Bins

3.1.1 The specifications of the Melting Oven are as follows:

- Made of Steel casserole with cover, double jacketed body and LPG fired with three-line burner.
- It has a melting capacity of 50 kgs per batch of 1 to 1.5 hours.
- A cylindrical steel downspout is added to facilitate the discharge of melted waste plastic sando bags during casting into the metal molds.
- The chimney is installed with scrubber containing NaOH to absorb smoke emission during melting.
- A motorized blunger is installed for homogeneous mixing.
- The temperature recorder measures the melting temperature

3.1.2 Process description for the Melting Oven:

- Molded functional products were produced by melting the collected post consumer waste plastic sando bags in a preheated used cooking oil at 150 to 200oC for one to 1.5 hours using the fabricated portable melting unit.
- Melting 1 part (by weight) of waste plastic sando bags into 1 part (by weight) used cooking oil was found most suitable.

3.1.3 Products manufactured from the Melting Oven:

- The resulting molten waste plastic sando bags is easily molded by casting and converted into final products in the metal molds which displayed potential uses for tabletops, planters, catwalk/paving blocks and other valuable functional products



Figure 3.1-3 Plastic Melting Oven

3.1.4 Target Plastics

While PPIA encourages the segregation of plastic recyclables covered under the recycling guidelines, we only targeted Polyethylene and Polypropylene Films and Bags (PE/PP films and bags) and Foam Polystyrene (Foam PS) in our dispatch and collection efforts as the other plastic recyclables have existing recycling markets.

Figure 3.1-4 Densification Process

1 PET	PET – Polyethylene Terephthalate which are used for many bottles application because they are inexpensive, lightweight and shatter-resistant.
2 HDPE	PE/PP Rigids – Polyethylene and Polypropylene products which are used in rigid applications such as bottles, pallets, crates, drums and other hard plastics.
4 LDPE 5 PP	PE/PP Films and Bags – Polyethylene and Polypropylene products which are used in flexible applications such as bags, liners, and other single or mono-component soft plastics.
6 PS	Foam PS – Polystyrene products which are used in food service packaging. EPS – Polystyrene products which are used as cushioning materials for fresh produce, electronic or appliance industries, among other products.
3 PVC	PVC- Polyvinyl Chloride products which are used for pipes and fittings. It is noted that over 80% of PVC used in applications have service lives of more than 10 years, thus, there is usually minimal PVC in municipal wastes.

3.1.5 Plastic Bag Recycling

There are recyclers of plastic film bags located in Metro Manila. These firms either source their raw materials from post-industrial plastic films from bag manufacturers or post-consumer bags from dumpsite and other sources.

Types of Plastic Bags	Examples
High Density Polyethylene (HDPE)	grocery, wet market bags or sando bags, and trash bags
Low Density Polyethylene (LDPE)	Bags for sugar, rice, toys, shopping bags in department stores
Polypropylene (PP)	packaging for T-shirt or clothing

Post-industrial plastic films particularly those made into plastic bags are 100% being recycled or converted anew into pellets. Once recycled, films can be used to manufacture a variety of products. For example, it is used in applications, such as trash bags and construction films. It is also used in household products, like garbage cans, wastebaskets and recycling bins.

Recyclers accept post-consumer plastic bags from LGUs as long as they can collect by the truckload or at least 500 kilos per hauling on a regular basis. Payatas junkshops currently supply these recyclers.

For purposes of this study, PPIA partnered with the Metro Plastic Recycling Association, Inc. (MPRAI) for the recycling of plastic bags collected from the plastic sites. MPRAI cooperated by way of accepting non-commercial quantities of post-consumer plastic bags from the pilot sites.

There is a lot of potential for developing the recycling market for post-consumer plastic bags in Metro Manila which requires the cooperation by LGUs cascading to the barangays and the households.

By collecting the recyclables from the households, they not only reduce the volume of waste going to the dumpsite but also derive income from trading additional recyclables with the junk shop operators.

Recyclable materials sorted at source and kept clean and dry sell higher than when they are stained by garbage. This becomes an incentive for the Eco-aides to teach households to properly segregate and/or even clean the recyclables themselves.

3.1.6 Foam Polystyrene Recycling

Foam PS is currently sourced directly from fast food restaurants. PPIA is currently linking up with

Polystyrene Packaging Council of the Philippines (PPCP) for the processing of Foam PS.

3.1.7 Operational Framework

(1) PPIA coordinates with the National Solid Waste Management Commission Secretariat and LGU Solid Waste Management Offices in the implementation of this project.

(2) The project has a two-fold approach:

1) First, promote the proper segregation by the households of plastic recyclables including plastic bags and Foam PS following the established recycling guidelines at the household level with the cooperation of Barangay eco-aides.

2) Second, link-up the barangays and schools with plastic recyclers for the collection of post-consumer plastic bags and Foam PS

(3) PPIA will only process the plastic bags and Foam PS through the melting oven in the event that the collected wastes are contaminated.

(4) Barangays and schools shall be given incentives to increase collection and segregation of plastics. For barangays and schools, PPIA shall donate plastic trash bags for every kilo of plastic bags or Foam PS collected. For schools, PPIA shall install special standing bins to be strategically located inside schools as drop off points for plastic bags and foam PS. PPIA shall also install plastic drums (120 liter) for temporary storage of target scraps inside the school MRFs.

3.1.8 Site Selection Criteria

The efforts of households in the barangays play a significant role in the recycling activities as their effort to segregate and properly handle recyclable materials will greatly affect the efficiency of scrap dealers and recyclers.

PPIA encouraged barangays to cascade to the households the segregation and inclusion of plastic bags and Foam PS as part of their recyclables.

Barangays, on the other hand, may encourage buyers and junk shop dealers of plastic recyclables (especially PET, and rigid PE/ PP post consumer waste) to accept the collected plastic “sando” bags and take the responsibility in delivering the same to the recyclers. For barangays to sell the recyclables at a higher value, they may choose to deliver the waste plastic bags directly to the recycler. Thus, the project’s priority is for the recyclables to end up with the recyclers.

(1) Criteria for Barangays:

PPIA, in consultation with the Solid Waste Management Offices of the Cities of Caloocan, Quezon and Valenzuela and the National Solid Waste Management Commission (NSWMC) Secretariat, arrived at the following criteria for selection:

1) Must have an operational Material Recovery Facility (MRF) with an established network with junk shop operators.

2) Has a record of plastic recyclables collected and traded

3) Located near Barangays which makes clustering possible

For purposes of studying the effectivity of the criteria, PPIA chose LGUs with different levels of MRF operation.

Table 3.1-1 Pilot LGUs

Criteria	LGU	Coordinator	Pilot Sites
Operational MRF	Quezon City	Quezon City Environmental Protection & Waste Management Department	- 4 Barangays
Semi-operational MRF	Caloocan City	Environmental Sanitation Services (ESS), Caloocan City	- 1 Cluster of 4 Barangays - 1 Cluster of 6 Barangays
No MRF	Valenzuela City	Waste Management Office, Valenzuela City	- 1 Barangay

(2) Criteria for Schools:

Pilot schools must have a staging area for collected plastic bag and Foam PS prior to pick-up by PPIA. Upon the recommendation by the QC EPWMD, and in consultation with the NSWMC Secretariat, PPIA selected Miriam College and Claret School of Quezon City as pilot sites.



Figure 3.1-5 PPIA Pilot Areas

3.1.9 Profile of Pilot Areas

SITE		BASIS
Name of Barangay	**GREATER LAGRO**	• Brgy prohibits non-accredited junk shops from collecting recyclables. Only the eco-aides of barangay can collect recyclables from the households and schools • 12 eco-aides with side cars collect recyclables during Mondays and Thursdays. • Has database on collected plastic recyclables • Brgy. Chairman suggests that households segregate all plastic recyclables including toothpaste tubes and sachets so as to simplify explanation to households and make it more easier for them to segregate to which QCEPWMD agreed as this is consistent with the slogan "Plastics are 100% recyclable
City	Quezon City	
Population	19,632	
Barangay Captain	MANUEL C. TOLENTINO	
Phone No.	417-1434	
Brgy. Address	Lagro Plaza	
Phone No.	417-1583	
Name of Barangay	**GREATER FAIRVIEW**	• Has 20 eco-aides in push carts that can collect plastic bags • MRF has enough space to undertake cleaning and drying of post-consumer plastic bags • Brgy. forms a cluster with Brgys. Greater Lagro and Holy Spirit
City	Quezon City	
Population	30,332	
Barangay Captain	JOSE ARNEL L. QUEBAL	
Phone No.	930-3368	
Brgy. Address	Dahlia St., East Fairview	
Phone No.	937-1761	
Name of Barangay	**HOLY SPIRIT**	• Brgy. has previous collection efforts for plastic bags (converting them to twine) • Agreed to start collecting plastic bags anew • Currently operates 8 sanitary trucks manned by 6 crew members per truck • High potential for collection due to size of barangay
City	Quezon City	
Population	89,456	
Barangay Captain	FELICITO A. VALMOCINA	
Phone No.	430-8723	
Brgy. Address	Faustino St., Isadora Hills	
Phone No.	4311663/4301122	
Name of Barangay	**NEW ERA**	• Currently only 3 eco-aides collecting plastic bags and Foam PS in the barangay. Eco-aides used to collect and clean plastic bags and PS. • New Era University generates mostly Foam PS which are collected and stored at MRF.
City	Quezon City	
Population	5,540	
Barangay Captain	LUISITO B. SISON	
Brgy. Address	Saint Joseph Street	
Phone No.	456-5835	
Name of Barangay	**82,83,84,85 clustered**	• One MRF constructed to service 4 Barangays located in Morning Breeze subdivision • Has 8 eco-aides with push carts
City	Caloocan City	
Barangay Captains	LOIDA I. ALCEDO (82) CARLOS FLORENTINO (83) RICOJUDGE ECHIVERRI (84) LEOVILO CHING (85)	
Brgy. Address	Monserat St., Sacred Heart	

SITE		BASIS
	Parish	
Name of Barangay City Barangay Captains Brgy. Address	**126,127,128,129,130,131 clustered** Caloocan City FERNANDO ENRIQUEZ (126) JOSEFINO A. MIRANDA (127) ORLANDO M. GUARINO (128) RODOLFO SANGALANG (129) RAMON P. DOMINGO (130) RICARDO LIZARONDO (131) Tagaytay St., Caloocan City	• 6 Barangays clustered on the basis of proximity situated along Tagaytay and Binhagan Streets in Caloocan City • Each barangay deputizes 1 recyclables collector in push carts • Collected plastic bags are immediately transferred to MRF of Brgy. 82-85 cluster due to space limitation
Name of Barangay City Barangay Captain	**MARULAS** Valenzuela City MICHAELITO BENOZA	• Valenzuela Waste Management Office (WMO) suggested Barangay Marulas as a pilot project considering that the Valenzuela Ecology Center is located there and can serve as a staging area of the collected plastic bags.

Table 3.1-2 SITE SELECTION: SCHOOLS

SITE	BASIS
MIRIAM COLLEGE Dr. Patricia Licuanan, PhD. President Katipunan Road, Loyola Heights Quezon City 1108 Tel No. 580-5400 o 29	• 9,000 students and 800 employees • MRF segregates PP plastic cups, PET bottles, aluminum cans, paper and EPS • Melting oven (2nd generation) is currently used for demo purposes only.
CLARET SCHOOL OF QUEZON CITY Rev. Fr. SALVADOR G. AGUALADA JR., CMF School Director Mahinhin St., UP Village Diliman, Quezon City Tel No. 921-8136	• 4,500 students and 350 employees • Claret's MRF sells recyclables to junkshop in Payatas. MRF is manned by 2 utility men from Payatas junk shop. • Getting the students to donate their used plastic bags will require clearance from school administration. Mr. De Lima agreed to push the Pilot Project with the school admin.

3.2 Operational Procedure

PPIA developed an operating procedure for the dispatch and collection of the Mobile Truck which accompanied the MOA signed with pilot sites. PPIA evaluates the quality of recyclables whether they are in conformance with recycling guidelines. If in conformance with recycling guidelines, PPIA was supposed to contact the recycler for pick-up from PPIA. However, in actual operation, PPIA delivered the recyclables to the recycler after collecting from the pilot sites.

In the three (3) months of implementation, the plastic bags and Foam PS collected from the pilot sites were all found to be in conformance with the recycling guidelines and thus, were delivered to the recycler instead of processing on-site through the melting machine.

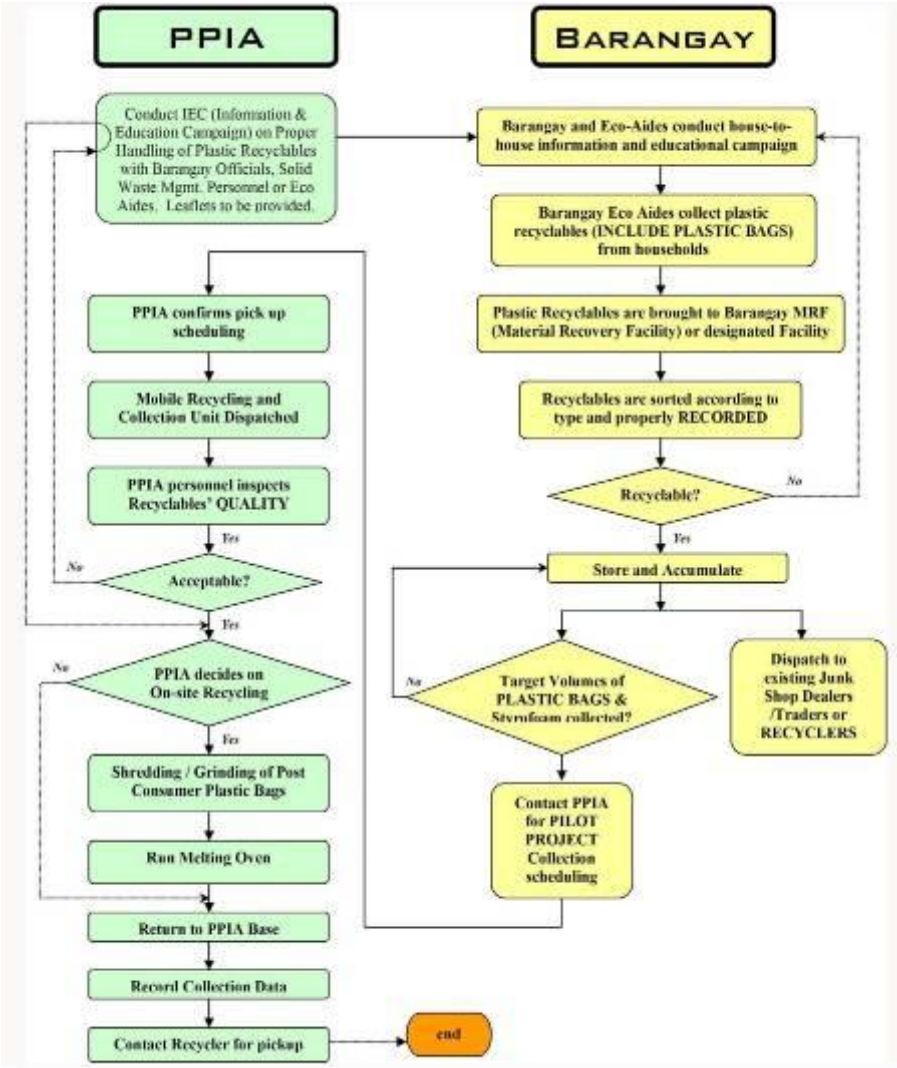


Figure 3.2-1 Process Flowchart

At Brgy. Greater Lagro, Holy Spirit and New Era plastic bags were already clean when given to the Brgy. Eco-aides but in Brgy. Greater Fairview, there were instances that Eco-aides have to clean and dry the plastic bags.

In Caloocan, plastic bags picked up from households were already clean.

Lack of awareness and discipline at the household level remains an issue in the implementation of the project.

3.3 MOA with Barangays

PPIA entered into a Memoranda of Agreement with the pilot sites in time for the formal launch of the pilot project scheduled on 14 September 2007.

In Quezon City, PPIA signed MOAs with QC EPWMD, Brgys. Greater Fairview, Greater Lagro, Holy Spirit and New Era.

In Caloocan, PPIA had informal agreements with Caloocan ESS and the 2 Barangay clusters in lieu of the MOA pending with the Office of the Mayor.

In Valenzuela City, the PPIA MOA with the Office of the Mayor and Brgy. Marulas were shelved due to the barangay elections. The previous council of Brgy. Marulas favorably endorsed the project to the Brgy. Chairman, however, he was eventually defeated during the elections.



Figure 3.3-1 PPIA MOA Signing with Pilot Sites

Under the MOA executed with Barangays the following are the corresponding roles of Barangays and PPIA.

3.3.1 Role of Barangays:

- Conduct a house-to-house Information and Education Campaign on the proper handling of plastic recyclables including plastic bags and Foam Polystyrene (PS);
- Collect recyclables and store inside the Material Recovery Facility (MRF) until the preferred volume for collection are reached. The preferred volume for the collection of plastic bags and Foam PS are 25 kilograms each bundled in such weight;
- Record all collected plastic recyclables before discharging to junk shops; and
- Contact PPIA for the collected plastic sando bags and foam PS during the pilot project and eventually make arrangements with the existing accredited junk shops or plastic recyclable dealers operating within the area.

3.3.2 Role of PPIA:

- Conduct an orientation on the Guidelines on Proper Handling of Plastic Recyclables and provide IEC materials (e.g. leaflets, etc.) to eco-aides;
- Schedule and dispatch the PPIA Mobile Plastic Recycling and Collection Truck to the respective barangay upon its advise when the preferred volume for collection are reached; and
- Operate the melting oven only when deemed necessary.

3.3.3 MOA with Schools

PPIA met with Miriam College and Claret School of Quezon City to formalize the partnership on the implementation of the pilot project. The outcome is as follows:

Table 3.3-1 Status of Pilot Schools

PILOT SCHOOL	STATUS

MIRIAM CO LLEGE	- MOA signed on 6 November 2007 contains the ff. features:
	- Conduct of Orientation for school personnel
	- PPIA donated 5 Glutton bins for the ff academic units:
	  - Grade School
	  - High School
	  - College Building
	  - Child Study Center
	  - Southeast Asian Institute of the Deaf
	- PPIA donated 3 drums for the MRF
	- Provision of paper for 3,000 letters to parents
	- Collection of Plastic bags is 28 kgs. and Foam PS is 49 kgs.

CLARET SCHOOL OF QUEZON CITY	- Existing informal agreement with School administration - School's collection of plastic bags generated inside the campus started on September 3rd - PPIA donated 3 Glutton bins and 2 drums to further promote collection - Total plastic bag collected as of 11 Dec is 196.5 kgs.

3.4 Information and Education Campaign

3.4.1 Flyers Promoting the Recycling Guidelines

PPIA developed a flyer informing the households on the various types of plastic recyclables and encouraging them to properly segregate.

During the orientation meeting with eco-aides, we emphasized that recyclable materials sorted at source and kept clean and dry sell higher than when they are stained by garbage. This becomes an incentive for the Eco-aides to teach households to properly segregate and/or even clean the recyclables themselves.



Figure 3.4-1 PPIA IEC Flyer

3.4.2 Orientation Meetings with Barangay Eco-aides

PPIA conducted orientation meetings with Brgy. eco-aides on Sept 19, 2007 in Quezon City and Sept 25, 2007 in Caloocan City. The presentation was conducted in *Tagalog*, the local vernacular, so as to explain the project concept in a simple language to the eco-aides.



Figure 3.4-2 PPIA Orientation Meeting with Eco-Aides

PPIA discussed the background of the pilot project, the types of plastics, the proper handling of plastic recyclables at the household level and the PPIA arrangements for the pickup of plastic bags and Foam PS at the Barangay MRF.

At the end of the orientation, PPIA distributed copies of the flyers to the representatives of the pilot areas as follows:

Table 3.4-1 PPIA Flyer Distribution to Pilot Sites

Pilot Area	Copies
Quezon City	
Brgy. Greater Fairview	1,500
Brgy. Greater Lagro	1,500
Brgy. Holy Spirit	1,500
Brgy. New Era	1,500
Miriam College	1,000
Claret School of QC	1,000
Caloocan City	

Brgy. 82-85 Cluster	1,000
Brgy. 126-131Cluster	1,000
Total	20,000

3.4.3 Tour of Plastic Recycling Plants

PPIA organized a plant tour for QC EPWMD, Caloocan ESS and pilot barangays and schools of two plastic recycling facilities in Valenzuela City on 19 December 2007 namely:

- **Plastic Bag Recycling**

  Phil-Ecoplast Recycling Industries Company, Inc.

  1150 Oliveros Cmpd., F. Bautista St., Ugong, Valenzuela City

- **Rigid Plastics Recycling**

  New Foundland Plastic Manufacturing Corp.

  #73 B. Maysan Rd., Valenzuela City

The purpose of the plant visit is to provide the barangays with an appreciation of the actual recycling process for plastic scraps especially the plastic bags which are the target recyclables in our project.

This activity was likewise intended to strengthen the link-up between the barangays and the recyclers in order to make the project sustainable and continue beyond the project schedule.

3.4.4 Radio Plugging for the Pilot Project

PPIA held two radio plugs for the pilot project on November 17 and 24, 2007 at DZXL Radio Mindanao Network hosted by Ariel Fernandez. The topic of the discussion is Plastic Recyclables as Livelihood for Barangays. PPIA was headed by Ms. Mary G. Ng, PPIA president; Crispian Lao, PPIA vice president; Benson Tang, MPRAI president; Alfred Chan, Commissioner NSWMC and Mark Delumen, PPIA Secretariat. Two representatives from the barangays were Brgy. Chairman Rommel L. Carreon, Brgy. 738, Zone 80 (San Andres, Manila) and Brgy. Chairman Rodolfo G. Peña, Brgy. 699, Zone 76 (Malate, Manila).



3.4.5 Point-Reward System

As an incentive to barangays and schools, PPIA rewards them a pack of trash bags (25 pcs.) for every 25 kilo of collected plastic bags and Foam PS.

This barter system is well-received by the pilot areas. The trash bags are made from 100% recycled HDPE material sourced from the pilot sites.

3.5 Dispatch and Collection Status

As of 15 January 2008, PPIA diverted a total of 1,206.81 kilograms of plastic bags and 46 kilograms of scrap PS coming from Quezon City and Caloocan City.

Plastic bags collected per Barangay are pre-weighted in the Barangay MRF and recorded in the PPIA Truck Collection Logbook and duly countersigned by a Barangay representative. Once this is brought to Phil-Ecoplast Recycling Industries Company, Inc., the plastic bag recycling plant, located in Ugong, Valenzuela City, it is again weighed for verification and thus, we use the net weight as reported to us by Phil-Ecoplast Recycling Industries Company, Inc.

Table 3.5-1 Waste Diversion as of 15 January 2008

	BRGY/SCHOOL	Collection Date	LGU	Scrap Plastic Bag (Kgs.)	Scrap Foam PS (Kgs.)
1	Brgy. 82-85 Cluster	8-Oct-07	CAL	62.00	
2	Brgy. 126-131 Cluster	8-Oct-07	CAL	24.00	
3	Brgy. Greater Lagro	16-Oct-07	QC	42.00	
4	Brgy. Greater Fairview	16-Oct-07	QC	40.00	
5	Brgy. Holy Spirit	16-Oct-07	QC	15.00	
6	Brgy. South Triangle c/o Brgy. Holy Spirit	16-Oct-07	QC	55.00	
7	Brgy. 82-85 Cluster	23-Oct-07	CAL	20.00	
8	Claret School of QC	13-Nov-07	QC	75.00	
9	Brgy. New Era	13-Nov-07	QC	4.50	21.00
10	Brgy. Holy Spirit	13-Nov-07	QC	19.00	
11	Brgy. Greater Fairview	13-Nov-07	QC	166.00	
12	Brgy. 82-85 Cluster	14-Nov-07	QC	61.36	
13	Brgy. 126-131 Cluster	14-Nov-07	CAL	36.95	
14	Brgy. 82-85 Cluster	10-Dec-07	CAL	48.00	
15	Brgy. Greater Fairview	11-Dec-07	QC	158.50	
16	Brgy. New Era	11-Dec-07	QC	5.00	25.00
17	Miriam College	11-Dec-07	QC	11.00	
18	Claret School of QC	11-Dec-07	QC	118.50	

	BRGY/SCHOOL	Collection Date	LGU	Scrap Plastic Bag (Kgs.)	Scrap Foam PS (Kgs.)
19	Brgy. 82-85 Cluster	15-Jan-08	CAL	168.00	
20	Brgy. 126-131 Cluster	15-Jan-08	CAL	77.00	
	TOTAL			**1,206.81**	**46.00**

Foam PS is temporarily stored inside the PPIA building until such time that it accumulates to a truck load before delivering to the Polystyrene Packaging Council of the Philippines or a PPCP-endorsed recycler.

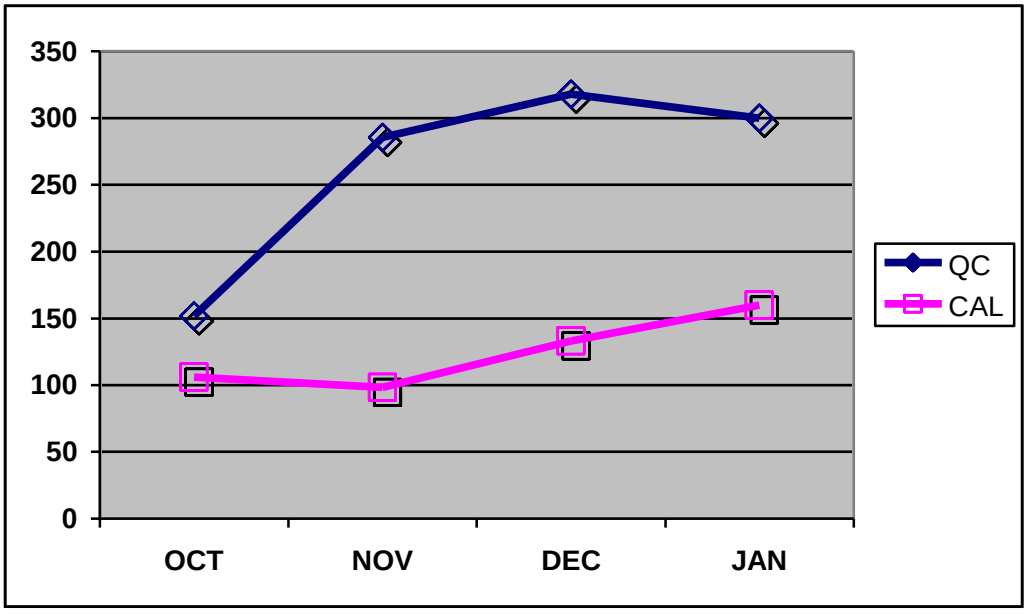


Figure 3.5-1 PPIA Collection Graph

In the first three months of project implementation, the collection drive steadily increased. The level of awareness by the households improved during the second month of IEC when eco-aides viewed the Mobile Plastic Collection and Recycling Truck accompanied by LGU Solid Waste Management and PPIA representatives. The eco-aides realized that the proponents are serious in their efforts to implementing the project and increase waste diversion. The information relayed by the eco-aides enthused households to practice segregation of plastic bags and Foam PS (in the case of Brgy. New Era) in the succeeding months which explains the increase.

For January, PPIA collected 245 kilos from Caloocan City 85 kilos of which were supposed to be collected last December. PPIA expects to collect 300 kilos from Quezon City.

Table 3.5-2 Total Collection Per LGU in Kgs. as of 15 January 2008

	OCT	NOV	DEC	JAN	TOTAL
QUEZON CITY	152	285.5	318	300*	1055.5
CALOOCAN CITY	106	98.31	133	160	497.3
TOTAL	258	383.81	451	465	1557.81

*Projected

3.6 Changes in Political Leadership

The October 29 Barangay Elections brought changes to the political landscape in the Barangays where we are implementing the pilot project. Although the incumbent Barangay Chairmen have until November 30 to complete their terms the impact on certain Barangays were immediate.

	FORMER BRGY CAPT.	NEW BRGY CAPT.
QUEZON CITY		
Brgy. Greater Lagro	Manuel C. Tolentino	Atty. Renato Galimba
Brgy. Holy Spirit	Felicito Valmocina	Estrella Valmocina
Brgy. New Era	Arch. Luisito B. Sison	Dr. Salvador Corpuz
CALOOCAN CITY		
Brgy. 83	Carlos Florentino	Ricky Aquino
VALENZUELA CITY		
Brgy. Marulas	Dr. Michaelito L. Benoza	Ernesto “Boy” De Guzman

	RE-ELECTED
QUEZON CITY	
Brgy. Greater Fairview	Jose Arnel L. Quebal
CALOOCAN CITY	
Brgy. 82	Loida I. Alcedo
Brgy. 84	Rj Echiverri
Brgy. 85	Leovilo Ching

QUEZON CITY

In Brgy. Greater Lagro the loss of Chairman Manuel Tolentino meant the end of the Eco-boys in

padyaks (side cars). As reported to us by the QC Environmental Protection and Waste Management Department (EPWMD), the Eco-boys who derive their allowances from the Chairman's office have stopped operating since November 2007. According to EPWMD, the incoming Chairman, Atty. Renato Galimba, is reviewing the effectivity of the solid waste management program of the Barangay.

Meanwhile, there was continuity in Brgy. Holy Spirit as Felicito Valmocina, who finished his third term will be replaced by his wife Estrella.

Likewise in Brgy. New Era, Architect Luisito Sison was replaced by Kagawad Dr. Salvador Corpuz, who was a member of the Environment Committee of the Barangay who approved the signing of our MOA with them on 23 October.

In Brgy. Fairview, it was a landslide victory for Chairman Jose Arnel Quebal who governs over the biggest Barangay in Quezon City.

CALOOCAN CITY

Three of the four Barangay Chairmen were re-elected which augurs well for the project..

VALENZUELA CITY

With the loss of Brgy. Marulas Chairman, Dr. Michaelito Benoza, we will have to re-introduce the project to the new Brgy. Council. The previous Council of Brgy. Marulas favorably endorsed the project to the Brgy. Chairman, however, he was eventually defeated during the elections.

3.7 Factors Affecting the Success of the Project

The result of collection in pilot barangays indicated that a prerequisite for effective collection of plastic recyclables are the ff::

Factor	Effect on the Project
Political	Changes in political leadership can disrupt project implementation regardless of the MOA executed with a predecessor as successor is not bound to the MOA. This is the case for Barangay Lagro.
Infrastructure	There is a need for an operational MRF which is a storage space with roofing and partitioned areas to hold recyclable materials in separate cells for plastic, glass, metal, aluminum, paper, etc. Brgy. Marulas in Valenzuela does not have a MRF and is incapable of recovering recyclables as a source of waste diversion. Brgys. 126-131 in Caloocan has a small MRF and does not have enough space to store collected plastic bags and relies on Brgys.82-85 MRF for storage.

	Eco-aides with push carts or karitons are necessary for the IEC and collection drive at the household level.
Economic	Barangays consider the economic benefit they will derive from participating in the project. All of the barangays agreed on a barter system for the collection of plastic bags and Foam PS except one barangay which prefers selling their collected scraps.
Social	Income classes have a bearing on the project. Although a thorough survey is required to verify this, the higher income class tends to consume and generate more scrap. Brgy. Fairview, Brgy. Lagro and Brgys. 82-85 in Caloocan which are inhabited by subdivision dwellers tend to contribute more scrap collection for the project. Education is important as indicated by schools which significantly contributed to the waste diversion efforts. Schools are suitable sites for project replication because training the students to properly segregate their wastes is an effective way of preparing the future generation as stewards of the environment.
Legal	Ordinances that accredit eco-aides or junk shops operating in the barangay help ensure recovery of recyclables from the households. This is practiced by Brgy. Fairview and Brgy. Lagro which accounted for 90 percent of the collection in Quezon City Barangays.

3.8 Conclusion

Considering that the project started from zero to 1.5 MT waste diversion of plastic bags and Foam PS in the pilot areas, the project succeeded in introducing a new source for increasing the waste diversion target for LGUs, barangays and schools.

On the one hand, Quezon City Barangays is continuing the collection of target recyclable materials beyond the project duration.

On the other hand, Caloocan City is expanding segregation of target recyclables as a city-wide project covering 188 barangays. According to the Caloocan Environmental Sanitation Services (ESS), they are targeting 50 percent of the barangays to implemented segregated collection which would already include plastic bags starting July 1, 2008 as part of its waste diversion efforts for the city.



Claret School of Quezon City and Miriam College are now segregating plastic bags. Miriam is also collecting Foam PS which is relatively more than the sando bags.

The success in the two pilot schools indicate that schools are suitable sites for project replication because training the students to properly segregate their wastes is an effective way of preparing the future generation as stewards of the environment.

The result of collection in pilot barangays indicated that a prerequisite for effective collection of plastic recyclables are the ff: 1) support and political will of the barangay chairman 2) operational MRF, 3) household level collection mechanism (i.e. eco-aides with karitons or sidecars), and clustering of barangays to ensure minimum collection.



The linkage between the barangays and recyclers will have a snowball effect on neighboring barangays as the recycling market for post-consumer plastic bag expands.

3.9 Project Sustainability

Some pilot sites have already been turned over to MPRAI. This is the case for Caloocan City.

PPIA will continue the collection operation on pilot areas not yet turned over to MPRAI.

PPIA will proceed with the collection and dispatch once new areas are identified based on set criteria namely:

1) support and political will of the barangay chairman

2) operational MRF

3) household collection mechanism (i.e. eco-aides with karitons, sidecars)

4) clustering of barangays to ensure maximum collection

PPIA recommends ordinances or measures to ensure success and continuation regardless political leadership i.e. accrediting eco-aides so that recyclables fall in the hands of barangay.