

2. Case Study II

2.1 Cellular Phone Waste Collection

2.1.1 Executive Summary

The Cellular 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 collection 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. 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.

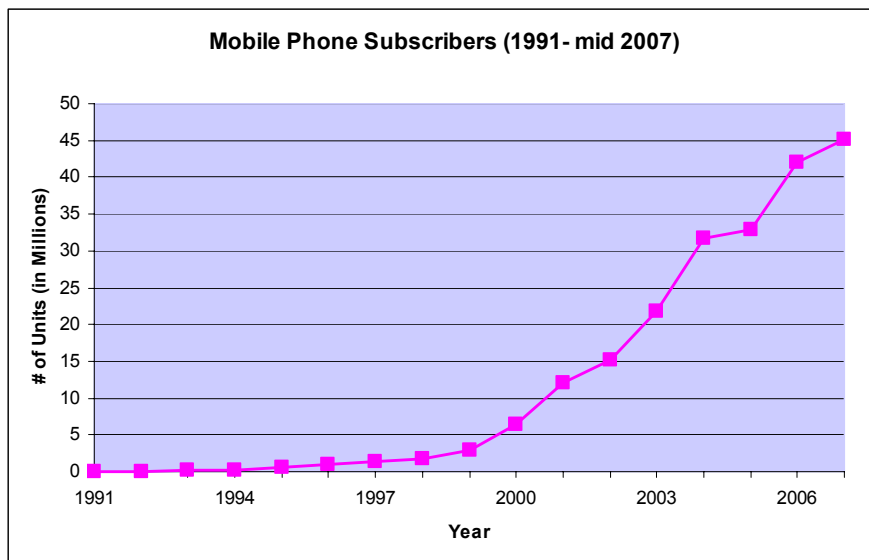
2.2 Framework and Context

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 during the 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 2.2.1 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.



Source: Network service providers subscriber data

Figure 2.2.1 Mobile Phone Subscribers in the Philippines, 1991-mid 2007

It is estimated that the average lifespan of mobile phones, commonly called cellular phones or cell

phones locally, is 18 months¹. 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. 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.

2) Policies on Electronic Waste

In the Philippines, prior to its accession to the Basel Convention in 1993, the “Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 (Republic Act 6969)”, had been enacted 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 classified⁴. There have been some take-back programs initiated by cellular phone companies, which will be discussed further in this chapter, 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

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 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.

venue for direct trade or disposal with the consolidator or recycler of these materials.

2.3 Case Study Goals and Objectives

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

- increase public awareness on proper disposal of cell phone waste especially among cell phone users; and
- 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 units, batteries, chargers 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.

2.3.1 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 (EMB), and the JICA Study Team. The Steering Committee met regularly to discuss direction and strategy of the Case Study.

(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. Following table shows the member of the TWG.

Table 2.3.1: Member of TWG

Cellular Phone Manufacturers	<ul style="list-style-type: none"> ◆ Alcatel (Versatile Telecoms International, Inc. ◆ LG Electronics Philippines, Inc. ◆ Motorola Communications Philippines, Inc. ◆ Nokia Philippines, Inc. ◆ Samsung Electronics Philippines Corp. ◆ Sony Ericsson Mobile Communications International AB, Philippines Branch.
Network Service Providers	<ul style="list-style-type: none"> ◆ Digital Mobile Philippines, Inc. (Sun Cellular) ◆ Globe Telecommunications, Inc. ◆ Smart Communications, Inc.
Shopping Malls	<ul style="list-style-type: none"> ◆ Ayala Malls Group of Ayala Land ◆ Ortigas and Company Limited Partnership ◆ SM Prime Holdings, Inc.
E-waste Collector/recycler	<ul style="list-style-type: none"> ◆ HMR Envirocycle Philippines, Inc.

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 members.

Table 2.3.2 Composition of the Case Study Team

Member	Function
Project Manager (1)	◆ Manage overall of the Case Study 1
Study Coordinator (1)	◆ Coordinate closely with the major stakeholders, program partners and technical working group. ◆ Assist in the development of information, education and communication campaigns.
Project Administration Officer (1)	◆ Administrative and fiscal concerns of the project including logistics and procurement of materials
IEC Officer (1)	◆ Design appropriate strategies and materials for information, education and communication campaigns
Digital Artist (1)	◆ Develop the actual IEC materials
Technical Assistants (2)	◆ Monitor collection and gather data from the field on a weekly basis, and 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 wastes discharged from those retail or repair shops are handled by the maintenance staffs of the malls.

2.3.2 Scope and Duration

(1) Timeframe 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 DTI-BOI and DENR. 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 TWG, 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) IEC Tools

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 Case Study was 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. Fortunately, 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. The collected cell phone wastes were temporary stored at either malls or SAGIP-Environment office after retrieval from the bins, which usually occurred every four weeks.

2.4 Methods and Strategies

The case study generally could be divided into four phases:

1. Project planning which included research and data gathering, and consultation with the Steering Committee and Technical Working Group;
2. Design and production of the cell phone waste bins and the appropriate information, education and communication (IEC) materials;

3. Signing of the Memorandum of Agreement during the launching of the pilot projects and deployment of bins and IEC materials; and
4. 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 2.4.1 illustrates the above mentioned project phases, while Table 2.4.1 shows the timeline of the activities.



Figure 2.4.1 Cell Phone Waste Collection Case Study Methodology

Table 2.4.1 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								

2.4.1 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.

- Meetings with malls – The CS team and representatives from the participating malls held several meetings to identify the 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.

2.4.2 Consultation with Stakeholders

In addition to the meetings mentioned above, 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.

2.4.3 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. The MOU was officially signed by all concerned parties during the launching event of the recycling program.

2.4.4 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 TWG members which have conducted cellular phone take back program, the team designed a bin which would be attractive at the same time informative.

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.

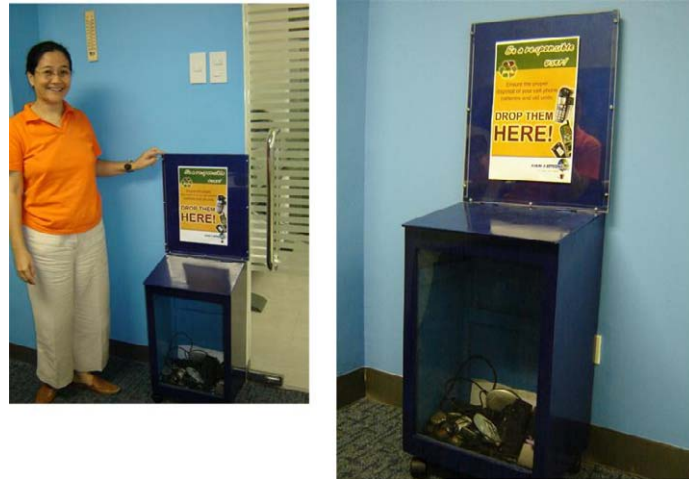


Figure 2.4.2. Bin Designs of Other Take-Back Programs

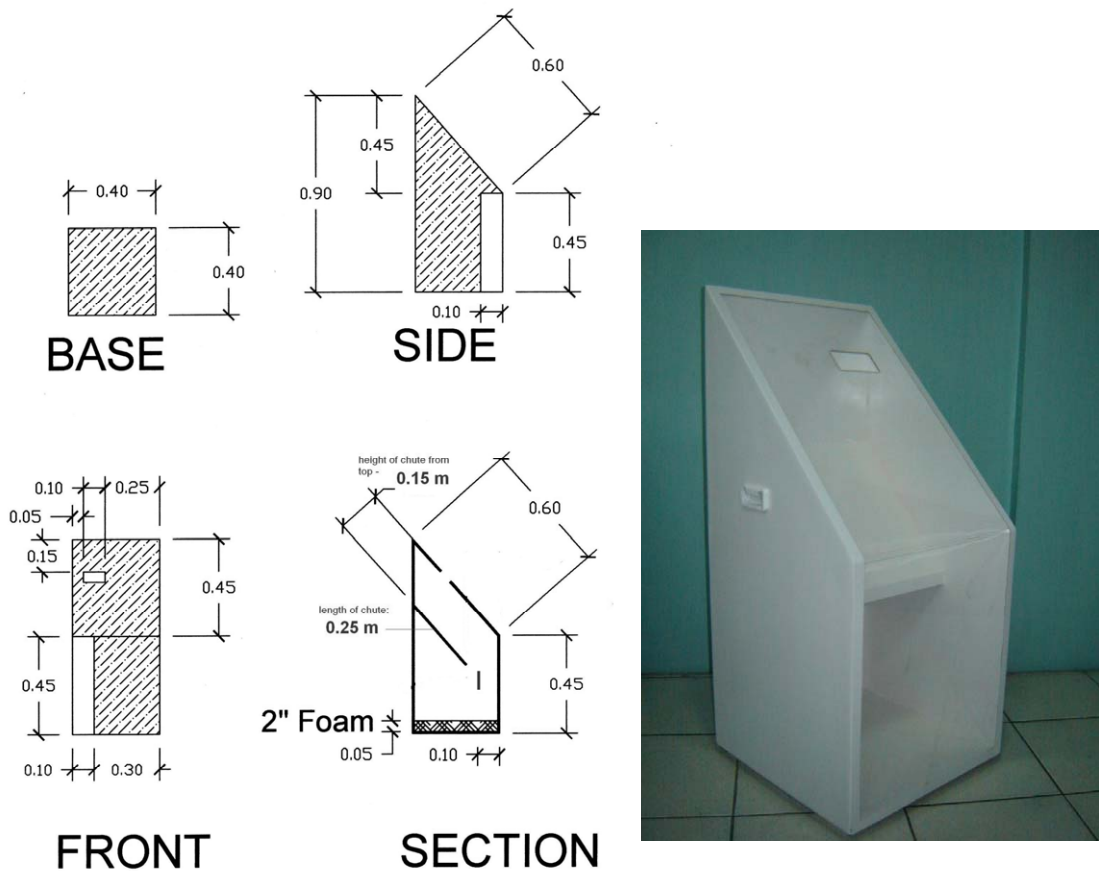


Figure 2.4.3 Bin Dimensions and Bare Bin Prototype

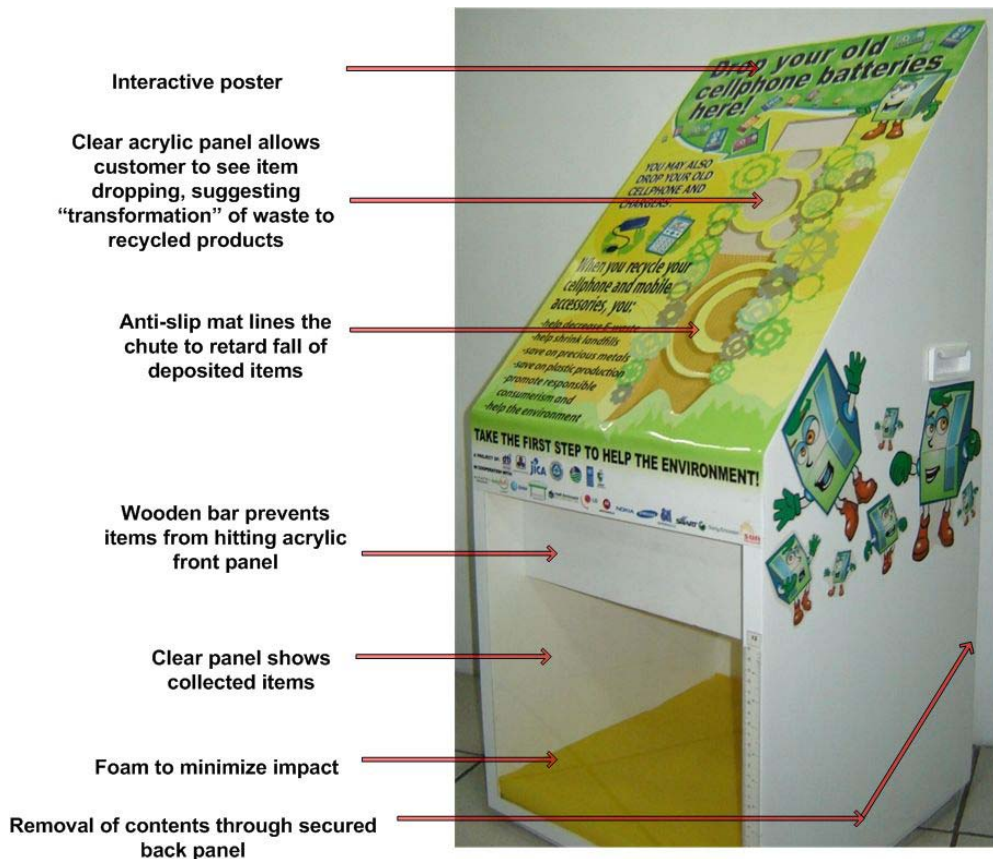


Figure 2.4.4 Cell phone waste collection bin features

2.4.5 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/she 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 2.4.5.



Figure 2.4.5 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 2.4.6).

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 2.4.6 Campaign poster features

(3) Exhibit

The informative exhibits were installed in the malls to promote the recycling program and case study. The exhibit contains various information related to cell phone recycling.

Upon consultation with the TWG, 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.

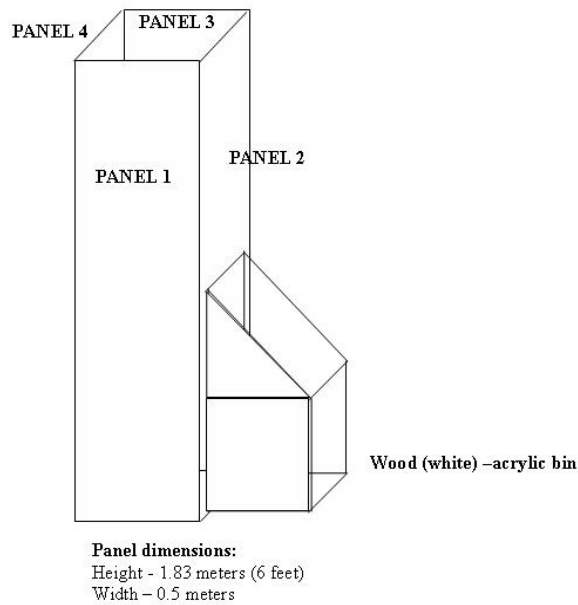


Figure 2.4.7 Informative installation set up and dimensions

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 while Panel 4 features the life cycle of a cellular phone. (See Figure 2.4.7)

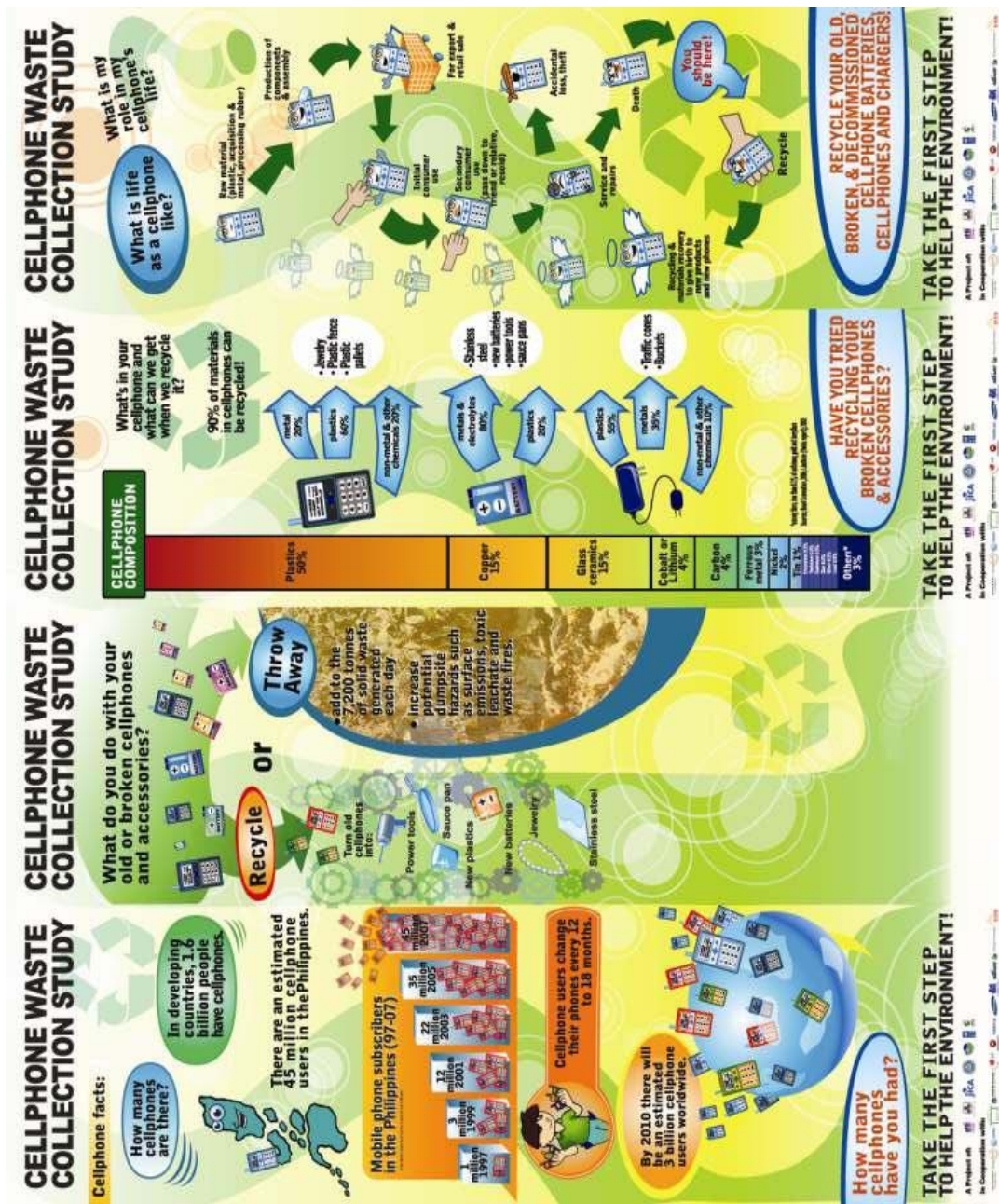


Figure 2.4.8 Contents of Informative installation, Panels 1-4

2.4.6 Launching and Campaign Proper

The project was launched on September 14, 2007 at the Dusit Hotel through the signing of the Memorandum of Understanding among 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 2.4.2 lists the types of areas these bins were placed and their distribution across the study sites, while Figure 2.4.9 gives the spread of the sites across Metro Manila and the maps of their locations in the malls.

Table 2.4.2 Types of Locations of Bin Distribution

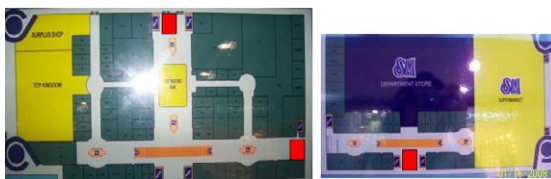
Type of Location	Glorietta - Greenbelt	Greenhills	SM Megamall	DTI-BOI	DENR	Totals
Entrances/ Exits	3		3			6
Main Lobby				1	1	2
Corridors and activity areas	2	1				3
Cell phone shop areas/ technology hubs	1	3	1			5
Network Service Providers Service Centers		2	2			4
Totals	6	6	6	1	1	20



Bin Locations:
Glorietta
and
Greenbelt



Bin Locations:
Greenhills Shopping Center



Bin Locations:
SM
Megamall
(clockwise)
Mega A,
Mega B,
Cyberzone

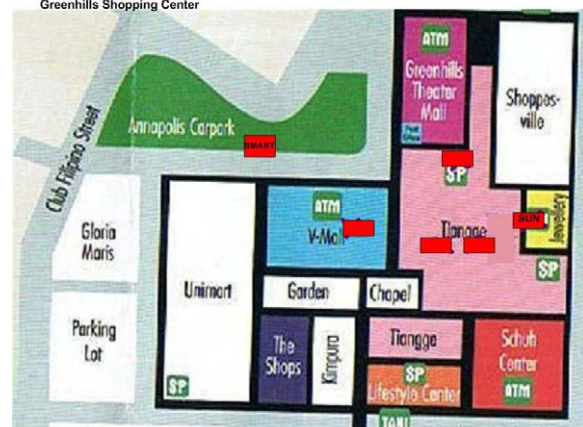
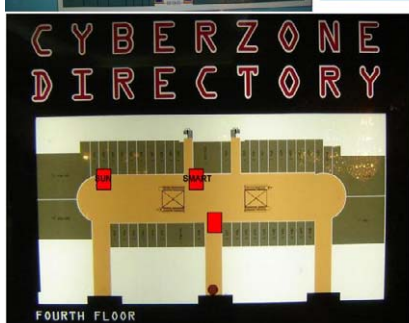


Figure 2.4.9 Project Sites and Location Maps of Bins in the Malls

2.4.7 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.

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. When the cellular phone waste collected were accumulated to a certain amount, they were transported and stored in Laguna Facility HMR Envirocycle.

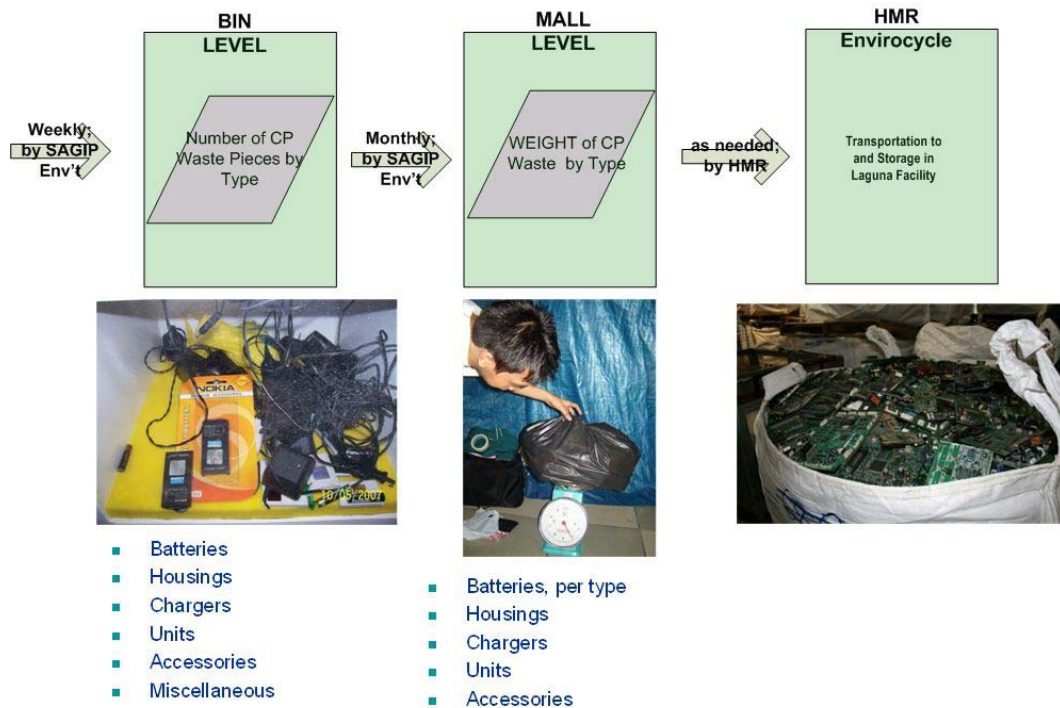


Figure 2.4.10 Monitoring and Collection Protocol

2.5 Outcomes and Analyses

2.5.1 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 cell phone 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 2.5.1. 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. This is where almost all the cell phones 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 while in SM Megamall, the entrances/exits and the Cyberzone bin yielded the highest collection.

2) Total collection volumes across sites

Greenhills Shopping Center contributed the highest collection in terms of pieces and weight, comprising 82% and 62% respectively.

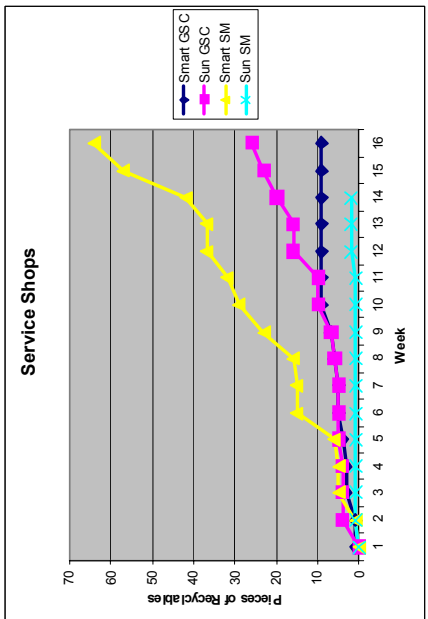
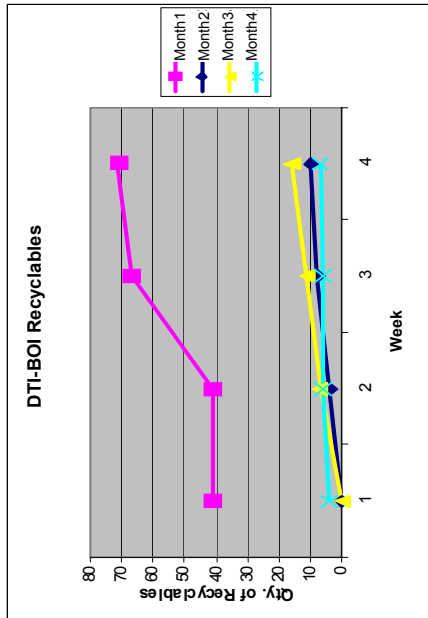
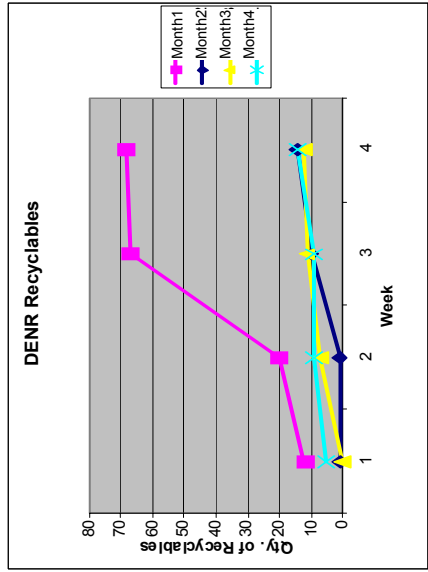
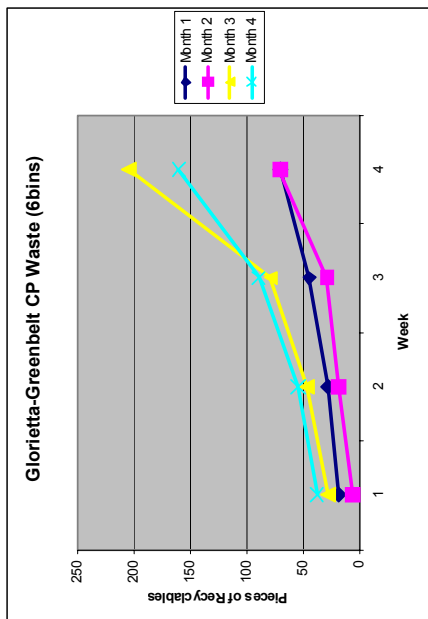
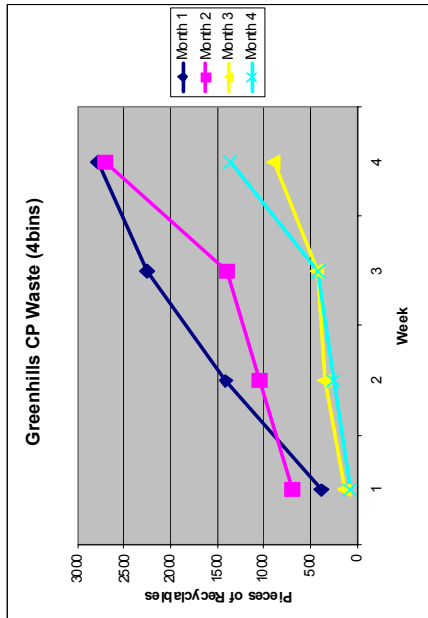
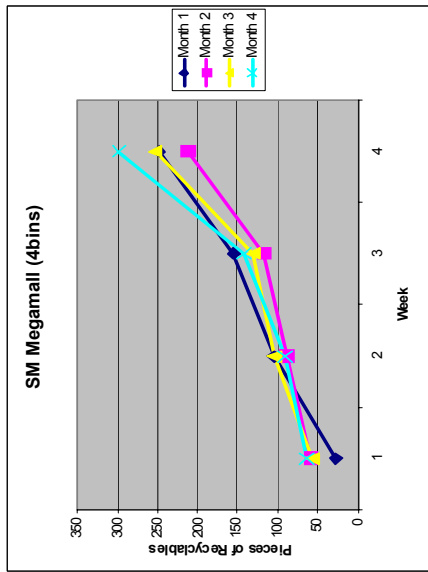


Figure 2.5.1 Collection Rates (# of pieces) Per Site

3) Collection patterns in the malls

Participation was noticed to have an oscillating pattern throughout the collection period (Figure 2.5.2). 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.

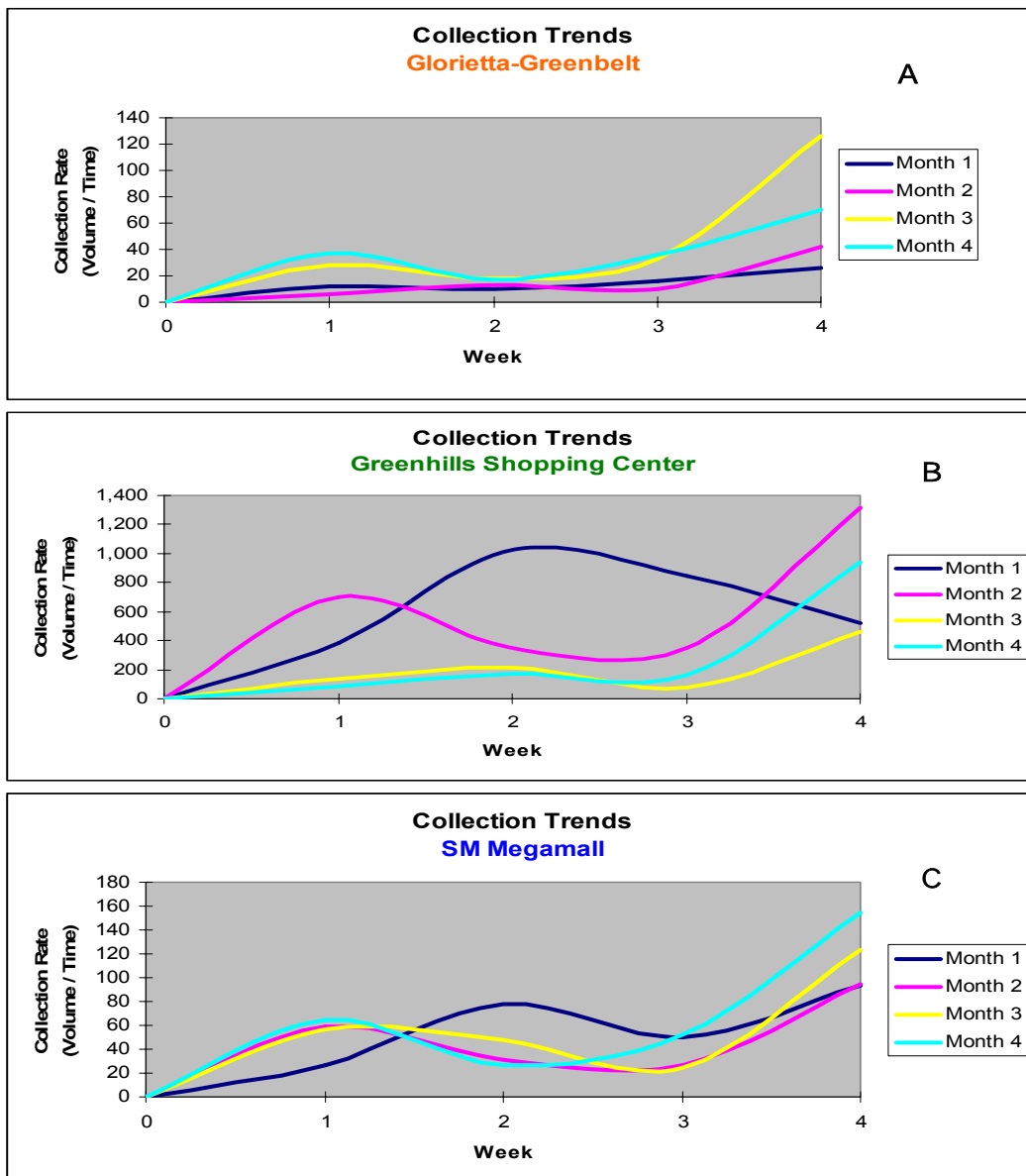


Figure 2.5.2 Collection Patterns in Malls

(2) 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 2.5.3).

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. 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 2.5.4.

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 2.5.4). 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.

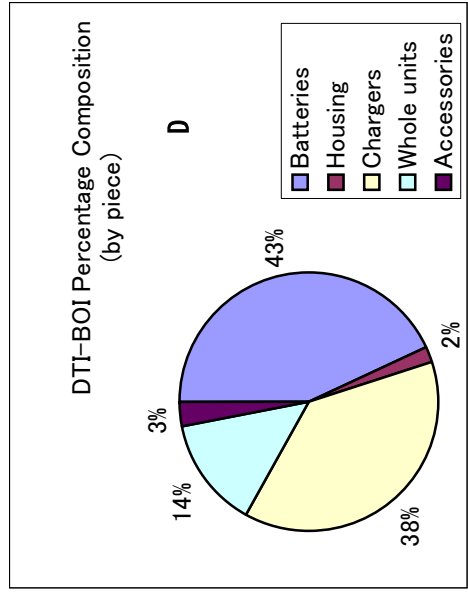
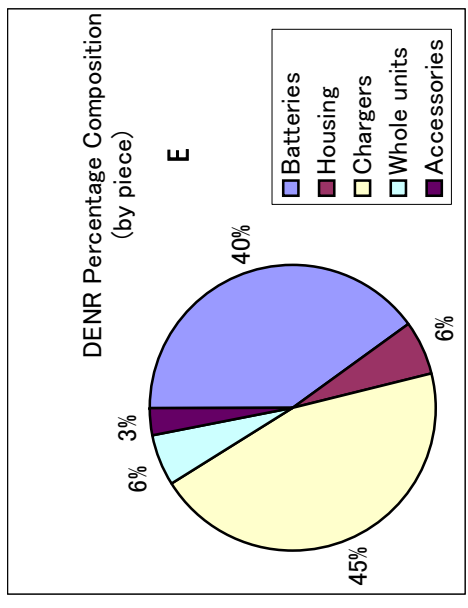
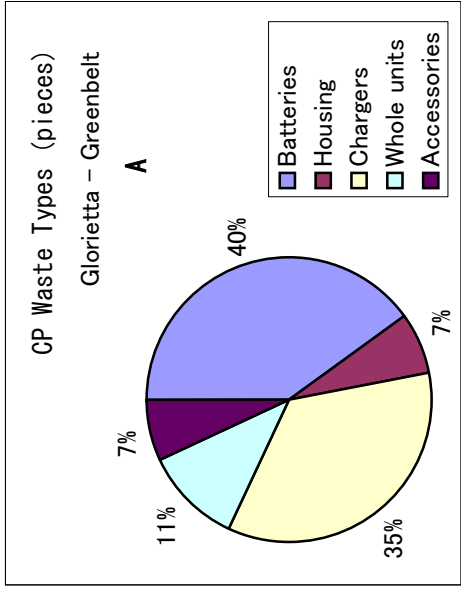
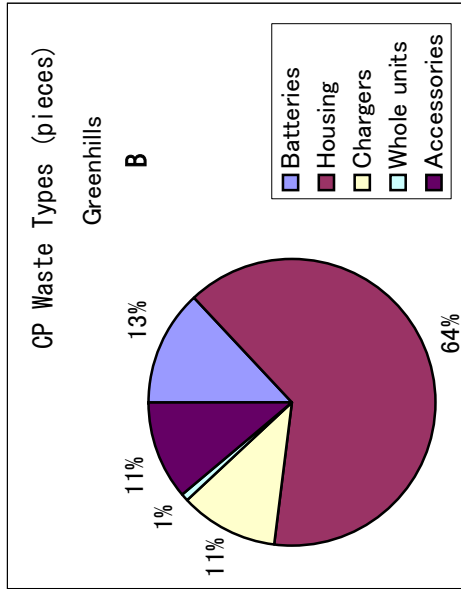
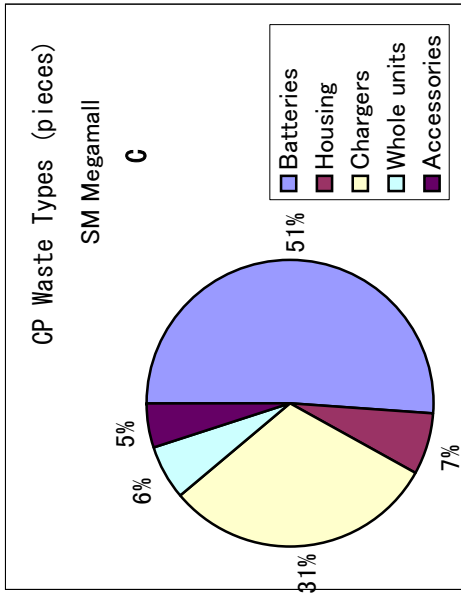


Figure 2.5.3 Cell phone waste types per site

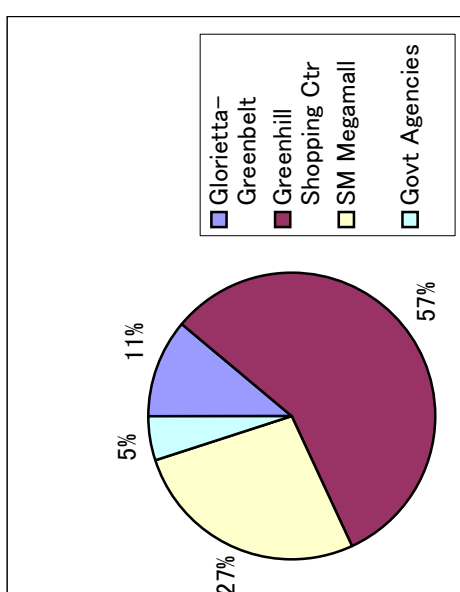
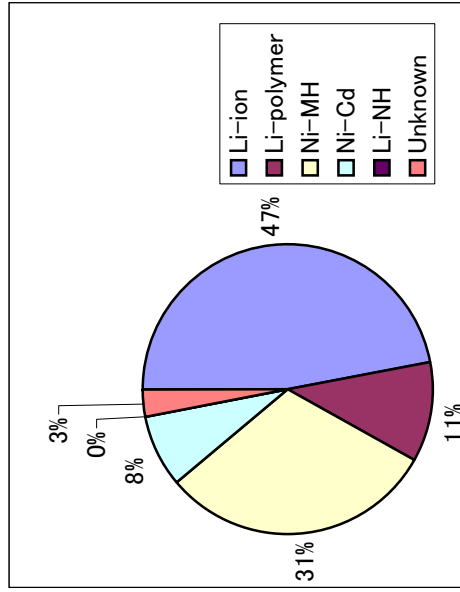
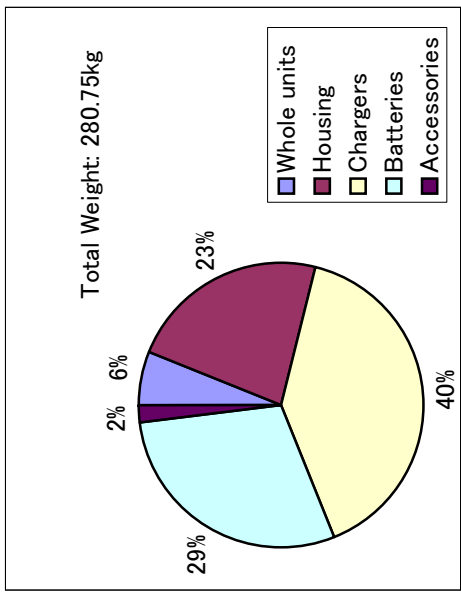
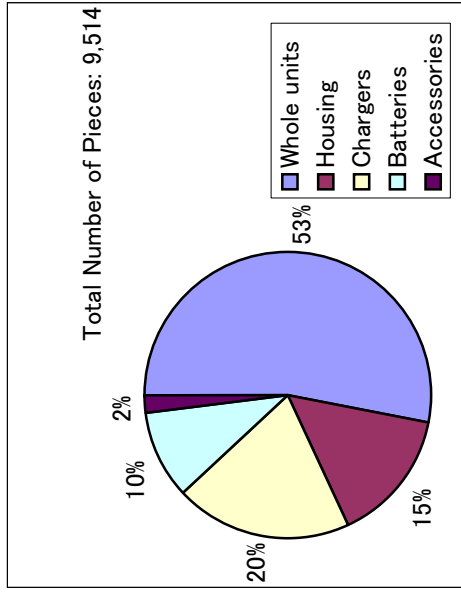


Figure 2.5.4 CP Battery Distribution

2.5.2 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 2.5.1 presents the amount of each type in terms of pieces and weight, as well as the monthly rates of collection.

Table 2.5.1 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 tones (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 2.5.2 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.

Table 2.5.2 Potential value of CP waste collected

Parameter	CP Units and Parts					Totals
	Phones	Housing	Chargers	Batteries	Accessories	
Amount of collected waste (kg)	15.80	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)	795.04	-	-	-	-	795.04
Total Value of Collected CP Waste (PhP)						1,946.06

(3) 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 2.5.3. Of these expenditures, the most significant cost was the production of the bin.

Table 2.5.3 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

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. Thus, this type of recycling system has good potential to be realized through efficient transportations, cooperation between public and private sectors on IEC, and secure enough volume by raising awareness and changing people's behaviors.

2.6 Conclusions and Recommendations

2.6.1 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.

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.

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 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.

2.6.2 Project Continuity

During the last TWG 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.

2.6.3 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.

2.6.4 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. Thus cooperation among not only government agencies but industries is also necessary in their respective roles in advancing publicity effort and thus cell phone waste recycling in the Philippines. TWG organized under this Case Study has a significant function that can permit a joint effort on achieving common goals among public and private entities, and continuous meetings to discuss further actions would cultivate the fruits.

3. Case Study III

3.1 Background of the Case Study II (Mobile Plastic Collection And Recycling)

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.

For plastics, the Philippine Plastics Industry Association, Inc. (PPIA), a non-profit industry association, was contracted to implement a six-month pilot project entitled “Mobile Plastic Collection and Recycling”.

3.1.1 Project Objectives

The main 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.

3.1.2 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).
 - 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 Terephthalate (PET)
 - 2) Polyethylene Rigids (PE Rigids)
 - 3) Polyethylene Flexibles (PE Flexibles)
 - 4) Polypropylene (PP)

5) Polystyrene (Foam PS, EPS)



Figure 3.1.1 Mobile Plastic Recycling Truck



Figure 3.1.2 Segregation Bins

3.1.3 Specifications of the Melting Oven

The specifications of the melting oven carried on the truck are as follows:

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

3.1.4 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 200 degree C 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.

3.1.5 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

3.1.6 Target Plastics

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







	<p>PET – Polyethylene Terephthalate which are used for many bottles application because they are inexpensive, lightweight and shatter-resistant. (e.g. Mineral/Drinking Water Bottles)</p>
  	<p>PE/PP Rigids – Polyethylene and Polypropylene products which are used in rigid applications such as bottles, pallets, crates, drums and other hard plastics.</p> <p>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.</p>
	<p>Foam PS – Polystyrene products which are used in food service packaging.</p> <p>EPS – Polystyrene products which are used as cushioning materials for fresh produce, electronic or appliance industries, among other products.</p>
	<p>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.</p>

Figure 3.1.4 Identification Code for Plastics

3.1.7 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.

Table 3.1.1 Types and Use of Plastic Bags

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 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 kg 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.

3.1.8 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.

3.1.9 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:
 - 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.

- 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 kg 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.

3.1.10 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:

- Must have an operational Material Recovery Facility (MRF) with an established network with junk shop operators.
- Has a record of plastic recyclables collected and traded
- 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 3.1.2 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.

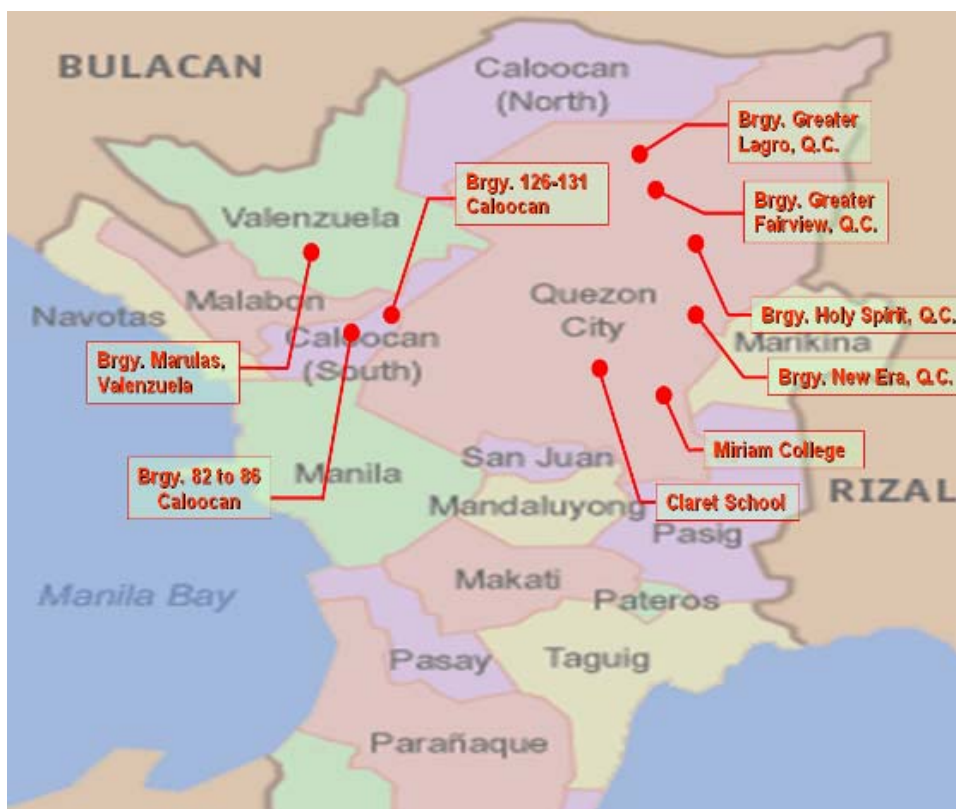


Figure 3.1.5 PPIA Pilot Areas

3.1.11 Profile of Pilot Areas

(1) Barangays

SITE		BASIS
Name of Barangay City Population Barangay Captain Phone No. Brgy. Address Phone No.	GREATER LAGRO Quezon City 19,632 MANUEL C. TOLENTINO 417-1434 Lagro Plaza 417-1583	<ul style="list-style-type: none"> 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 QC EPWMD agreed as this is consistent with the slogan "Plastics are 100% recyclable"
Name of Barangay City Population Barangay Captain Phone No. Brgy. Address Phone No.	GREATER FAIRVIEW Quezon City 30,332 JOSE ARNEL L. QUEBAL 930-3368 Dahlia St., East Fairview 937-1761	<ul style="list-style-type: none"> 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
Name of Barangay City Population Barangay Captain Phone No. Brgy. Address Phone No.	HOLY SPIRIT Quezon City 89,456 FELICITO A. VALMOCINA 430-8723 Faustino St., Isadora Hills 4311663/4301122	<ul style="list-style-type: none"> 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
Name of Barangay City Population Barangay Captain Brgy. Address Phone No.	NEW ERA Quezon City 5,540 LUISITO B. SISON Saint Joseph Street 456-5835	<ul style="list-style-type: none"> 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.
Name of Barangay City Barangay Captains Brgy. Address	82,83,84,85 clustered Caloocan City LOIDA I. ALCEDO (82) CARLOS FLORENTINO (83) RICOJUDGE ECHIVERRI (84) LEOVILLO CHING (85) Monserat St., Sacred Heart Parish	<ul style="list-style-type: none"> One MRF constructed to service 4 Barangays located in Morning Breeze subdivision Has 8 Eco-aides with push carts

SITE		BASIS
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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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.

(2) Schools

SITE		BASIS
MIRIAM COLLEGE Dr. Patricia Licuanan, PhD. President Katipunan Road, Loyola Heights Quezon City 1108 Tel No. 580-5400 o 29		<ul style="list-style-type: none"> • 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		<ul style="list-style-type: none"> • 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.

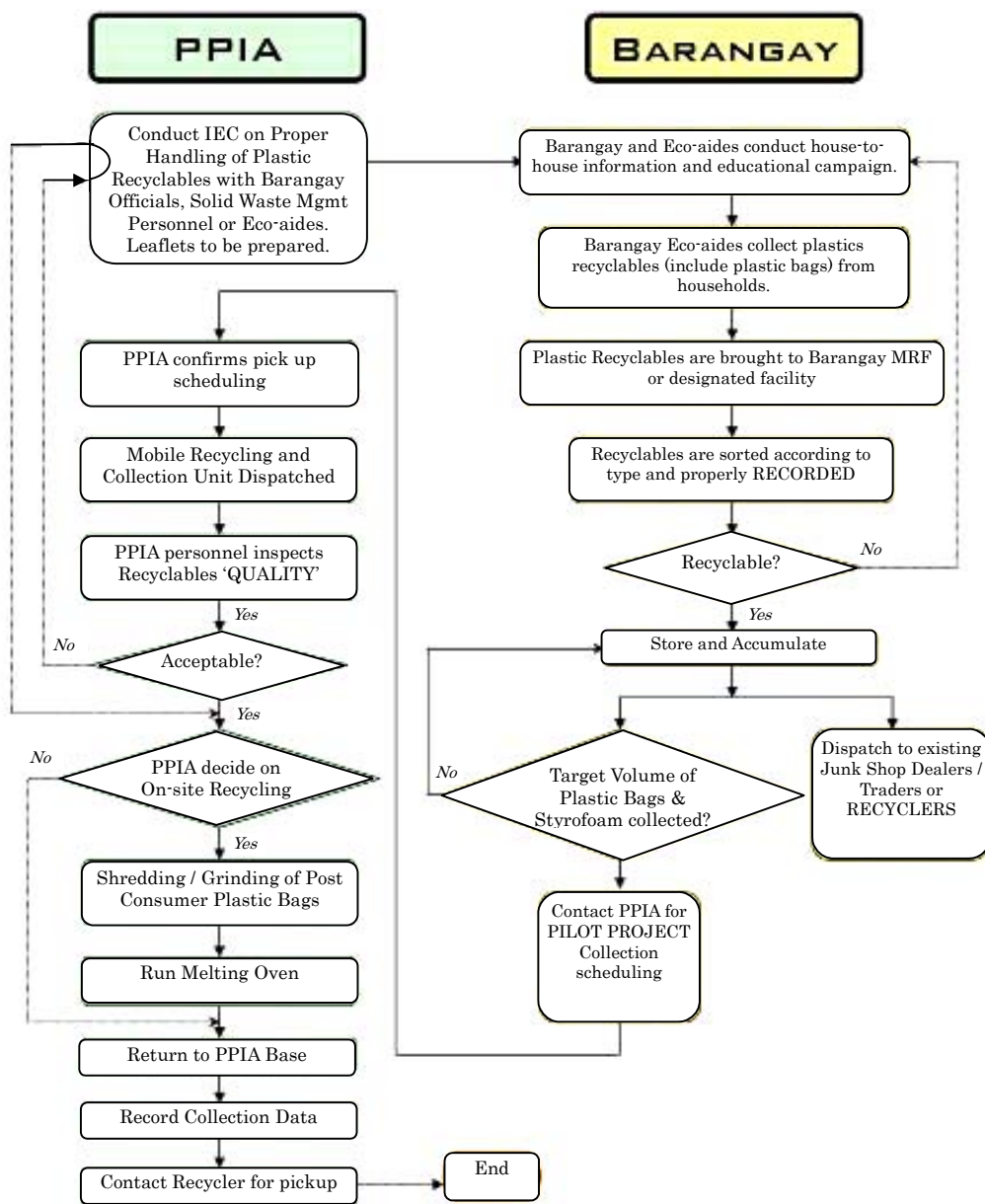


Figure 3.2.1 Process Flowchart

At Brgy. Greater Lagro, Holy Spirit and New Era plastic bags were already cleaned when given to the Brangay Eco-aides while in Brangay 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.



Figure 3.3.1 PPIA MOA Signing with Pilot Sites

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.

3.4 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 3.4.1 Status of Pilot Schools

PILOT SCHOOL	STATUS
<p>MIRIAM COLLEGE</p> 	<ul style="list-style-type: none"> - MOA signed on 6 November 2007 - Conduct of orientation for school personnel - PPIA donated 5 collection bins for the ff academic units: <ul style="list-style-type: none"> • 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 kg. and Foam PS is 49 kg.
<p>CLARET SCHOOL OF QUEZON CITY</p> 	<ul style="list-style-type: none"> - Existing informal agreement with School administration - School's collection of plastic bags generated inside the campus started on September 3 - PPIA donated 3 Glutton bins and 2 drums to further promote collection - Total plastic bag collected as of 11 Dec is 196.5 kg.

3.5 Information, Education and Campaign

3.5.1 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, it is 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.

PLASTIC IDENTIFICATION CODES

Ang plastik ay may numero o "code" na naaayon sa product standards upang matukoy kung anung uri ng materyal Ito at nakakatulong sa segregasyon at pagre-recycle.

	Polyethylene Terephthalate (PET): Makinaw na bote tulad ng Softdrinks, drinking o bottled water, tea drinks, cosmetics; gansap ng peanut butter, jelly, jam, mayonaisse...
	High-Density Polyethylene (HDPE): Mga bote ng gatas; shampoo; alcohol; detergents; manikila sa pagluto; lantig at flud ng mga sasakyan, plastic o "sardo" bag, paleta, crates, drums...
	Polyvinyl Chloride (PVC): Water / Electrical / Sanitary pipes, roofing sheets, window frames, doors; floor covering o linoleum, shower curtains, films and sheets, blister packs...
	Low-Density Polyethylene (LDPE): Bag ng makul at bigas, shopping bag, plastic material at madulas, shrink wrap, food containers, crop protection sheets, computer covers...
	Polypropylene (PP): Takip ng bote, microwavable food containers; clear cups, drinking straws; balye, mga selo ng bigas, mais, pataba...
	Polystyrene (PS): Foamed fast food trays, fruit and meat trays, plastic spoons & forks, protective packaging for appliances...

GUIDELINES ON THE PROPER HANDLING OF PLASTIC RECYCLABLES

(WASTONG PAMAMARAAN UPANG MA-I-RECYCLE ANG PLASTIC)

PLASTICS ARE 100% RECYCLABLE
Recycle your plastic bags now!

ALAGAAN ANG KALIKASAN Mag RECYCLE TAYO!

dti jica PPIA

Dept. of Trade and Industry Dept. of Environment and Natural Resources Phil. Plastics Industry Association, Inc. National Solid Waste Management Commission Dept. of Environment and Natural Resources

PILOT PROJECT ON MOBILE PLASTIC COLLECTION AND RECYCLING STUDY ON RECYCLING INDUSTRY DEVELOPMENT IN THE PHILIPPINES

SA MGA KABAHAYAN (Recycling Guidelines)

Tanggalin ang laman at Banlawan (Empty contents and rinse/wash)

Pitpin o Tupiin at Ipunin (Compress or Fold and Store)

Ibigay sa Barangay Eco-Aides o MRF (Give to Brgy. Eco-Aides or MRFs)

Linisin natin ang ating kapaligiran.

SA BARANGAY MRF'S (MATERIAL RECOVERY FACILITY) etc.

Tinatanggap ang mga recyclables at ipina-bubukod (Receiving recyclables for Sorting)

Ini-ipun sa Staging Area (Storing at the staging area)

Ipakukuha sa junk shops o scrap dealers (Pick up by junk shops or scrap dealers)

ALAM BA NINYO NA ANG MGA PLASTIC BAG AY NARE-RECYCLE? TOTOO PO! KAYAT ISAMA NINYO ANG INYONG MGA PLASTIC BAGS SA MGA RECYCLABLES NA KINUKUHA NG MGA ECO-AIDES.

Figure 3.5.1 PPIA IEC Flyer

3.5.2 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 3.5.2 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 3.5.1 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. 126-131 Cluster	1,000
Total	20,000

3.5.3 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.

Table 3.5.2 Recycling Plant Visited in the Tour

Plant	Type of Plastics
Phil-Ecoplast Recycling Industries Company, Inc. 1150 Oliveros Cmpd., F. Bautista St., Ugong, Valenzuela City	Plastic Bags
New Foundland Plastic Manufacturing Corp. #73 B. Maysan Rd., Valenzuela City	Rigid Plastics

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.

3.5.4 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).

3.5.5 Point-Reward System

As an incentive to barangays and schools, PPIA rewards them a pack of trash bags (25 pcs.) for every 25 kg 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.



3.6 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.

Table 3.6.1 Waste Diversion as of 15 January 2008

	BRGY/SCHOOL	Collection Date	LGU	Scrap Plastic Bag (Kg.)	Scrap Foam PS (Kg.)
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	
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 truckload before delivering to the Polystyrene Packaging Council of the Philippines or a PPCP-endorsed recycler.

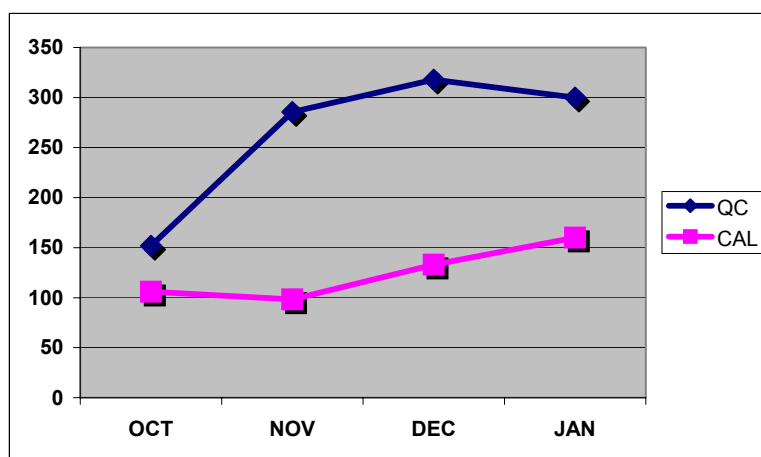


Figure 3.6.1 PPIA Collection Graph

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 Barangay New Era) in the succeeding months which explains the increase.

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

Table 3.6.2 Total Collection Per LGU in Kgs. as of 15 January 2008

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

*Projected

3.7 Changes in Political Leadership

The October 29 Barangay Elections brought changes to the political landscape in the Barangays where the Case Study is implemented. Although the incumbent Barangay Chairmen have until November 30 to complete their terms the impact on certain Barangays were immediate.

Table 3.7.1 Changes of Barangay Captains in Pilot Areas

	FORMER BRGY CAPT.	NEW BRGY CAPT.
<u>QUEZON CITY</u>		
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
<u>CALOOCAN CITY</u>		
Brgy. 83	Carlos Florentino	Ricky Aquino
<u>VALENZUELA CITY</u>		
Brgy. Marulas	Dr. Michaelito L. Benoza	Ernesto "Boy" De Guzman

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

3.7.1 Quezon City

In Barangay 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 Barangay Holy Spirit as Felicito Valmocina, who finished his third term will be replaced by his wife Estrella.

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

3.7.2 Caloocan City

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

3.7.3 Valenzuela City

With the loss of Barangay Marulas Chairman, Dr. Michaelito Benozza, the Case Study Team have to re-introduce the project to the new Barangay Council. The previous Council of Barangay Marulas favorably endorsed the project to the Barangay Chairman; however, he was eventually defeated during the elections.

3.8 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 followings:

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.

Factor	Effect on the Project
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.

3.9 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. 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:

- Support and political will of the barangay chairman,
- Operational MRF, and
- 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.

3.10 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.