CHAPTER 6

PILOT PROJECT II:
LOCAL RECYCLING NETWORK AND SOURCE SEPARATION OF MSW

CHAPTER 6 PP-II: LOCAL RECYCLING NETWORK AND SOURCE SEPARATION OF MSW

6.1 Background

Under the National Recycling Programme, all participating Local Authorities (LAs) were requested by MHLG to set up and develop their individual recycling (3Rs) programme to promote and enhance the recycling activities within the boundaries of the LA. There are many stakeholders involved in waste minimisation and recycling activities, however, the relationship among them is not clear and therefore recycling networks should be established and led by the respective LAs to spearhead the effective recycling activities and to promote MSW minimisation. The Recycling information management system should also be established to be inline with the National Recycling Programme.

The introduction of source separation of municipal solid waste (MSW) is the main activity of waste minimisation. Such activities have been previously introduced in trial-scale in Petaling Jaya, Putrajaya and Subang Jaya. However, in order to enhance such activity and to achieve the target of waste minimisation, proper waste minimisation management system should be implemented including source separation, collection of separated recyclables and to delivery of recyclables to the intended processors/ recyclers.

6.2 Outline of PP-II

PP-II comprises of two components:
(1) PP-II-1: The Establishment of Local Recycling Network in Model LAs
(2) PP-II-2: Source Separation of MSW

6.2.1 Project Purpose

The primary purpose of PP-II-1 is, firstly, to enhance or strengthen the practice of sustainable recycling under the leadership of the LAs, and secondly, to increase or improve the human resource capacity of the LAs to implement, coordinate and monitor recycling activity within their area of jurisdiction.
The project purpose of PP-II-2 is to increase the collection amount of recyclable materials separated at source.

6.2.2 Outputs

With the implementation of PP-II, the JICA Study Team intends to achieve the following outputs as outlined below.

(1) PP-II-1: Establishment of Local Recycling Network in Model LAs

PP-II-1 is designed to develop a Recycling Network and a systematic data management system in the 3 model LAs, namely, MP Pulau Pinang, MP Subang Jaya, MB Miri. The outputs below are anticipated from PP-II-1.

Table 6.2.1 Outputs of PP-II-1

Output 1	Data management system on SWM & 3Rs at the local level is established.
Output 2	Waste Minimisation Unit (WMU) is established in LAs (tentative-base).
Output 3	Recycling is carried out by stakeholders who participated in PP-II-1.
Output 4	3Rs related information is published.
Output 5	Capacity of LAs officials and regional 3Rs leaders are developed.

(2) PP-II-2: Source Separation of MSW

PP-II-2 is designed to introduce the practice of source separation at the source of generation as a crucial step to increase the recycling rate as well as the general awareness amongst the household and business entities.

Table 6.2.2 Outputs of PP-II-2

Output 1	Residents, communities and business entities carry out source separation.
Output 2	Recycling route of recyclables (paper, glass, can and PET) is established.
Output 3	Profit from selling recyclables return to communities/ institutions.
Output 4	Awareness of communities/ residents for waste minimisation/ recycling is enhanced.

6.2.3 Activities

The activities conducted to achieve the outputs targeted of PP-II are as follows:

(1) PP-II-1

To achieve Output 1, a waste flow survey was carried out to establish the baseline information of waste minimisation particularly on recycling in LAs. This was augmented with a questionnaire survey on the stakeholders operating within and around the LA's administrative area; the intention is to identify the waste flow and to obtain relevant information on stakeholders. Then, stakeholders' workshops to improve coordination and collaboration among the stakeholders identified during the survey were carried out were in each LA.

Based on the waste flow survey result, a data registration system was prepared in Microsoft Excel format as specified by the MHLG under PP-I. Collected data and information on stakeholders were compiled into a database, "Stakeholders' Directory" aiming at the formulation of network. These directories consist of a list of all the identified recycling agencies, and instructions how to prepare recyclables before bringing to those agencies, as shown in Appendix 9 (for MPPP), Appendix 10 (for MPSJ) and Appendix 11 (for MBM).

Activities undertaken to achieve Output 1 is as follows;

Activities 1: Establishment of Data Management System on SWM & 3Rs in Local Level	
1-1	Conducting of Survey on Present Waste Flow
1-2	Conducting of Stakeholders Forum to Clarify Role of Each Player
1-3	Establishment of Data Collection, Management & Reporting System
1-4	Set up of Database of Stakeholders & 3Rs Activities

To achieve Output 2 to 5, the following activities were conducted.

To achieve Output 2, the WMU was set up under the responsible unit in the model LAs. Computer, printers, phones line, fax as well as broadband Internet connection were procured for the WMU under the project. During the PP period, the WMU was staffed by LAs officers and appointed local consultants, and served as a base of all project activities, liaising with various stakeholders.

Activities 2: Establishment of Waste Minimisation Unit (WMU)

3Rs awareness promotions were conducted thorough several kinds of media in each LA, such as awareness brochures, and newspaper, aiming enhancement awareness on 3Rs among the public.

Activities 3: Publication of 3Rs Related Information	
3-1	Development of 3Rs Awareness Promotions

As part of capacity building of LAs officers, on-the-job training was carried out throughout the pilot project.

Activities 4: Capacity Development of LAs Officials and Regional 3Rs Leaders	
4-1	Conducting of On-the-Job Training

(2) PP-II-2

Under PP-II-2, source separation system was introduced and tested at several target areas selected in the model LAs.

In the planning process of PP-II-2, MHLG requested the JICA Study Team to select the target groups for source separation from a variety of groups ranging from households to office and business entities. After a number of meetings with the local consultants and representatives from the model LAs, MPSJ complex, South City Plaza in MPSJ, and Dynasty Hotel in Miri were selected as additional target groups for source separation project, in addition to the groups already identified.

To achieve Outputs1-4, the following activities were conducted in each target area.

Activities 1: Source Separation Programme	
1-1	Setting up of Source Separation System in Target Area
1-2	Explanatory Meeting for Residents in Target Area
1-3	Stakeholders' Workshop
1-4	Public Awareness Activities
1-5	Public Awareness Survey (only at households)
1-6	Monitoring of Source Separation Practice

6.2.4 Flow Diagram and Implementation Schedule

Flow Diagram and Implementation Schedule for the PP-II-1, and PP-II-2 are as shown below.

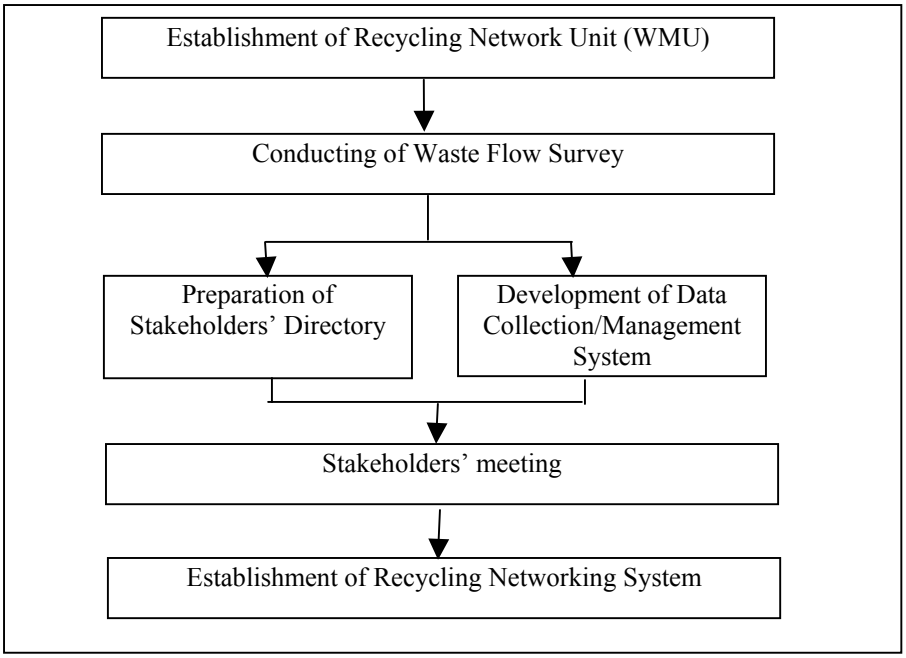


Figure 6.2.1 Flow Diagram for PP-II-1 : Recycling Network

Table 6.2.3 Implementation Schedule for PP-II-1

	Activities	Jun	Jul	Aug	Sep	Oct	Nov
1.0	Est. of Waste Minimisation Unit (WMU)						
2.0	Est. of Recycling Network in LAs						
2.1	Survey on waste flow						
2.2	Stakeholders workshop			△			
2.3	Preparation of Stakeholders' Directory						
3.0	Est. of Data Management System						
4.0	Development of 3Rs Awareness Promotion						
5.0	On-the-Job Training						

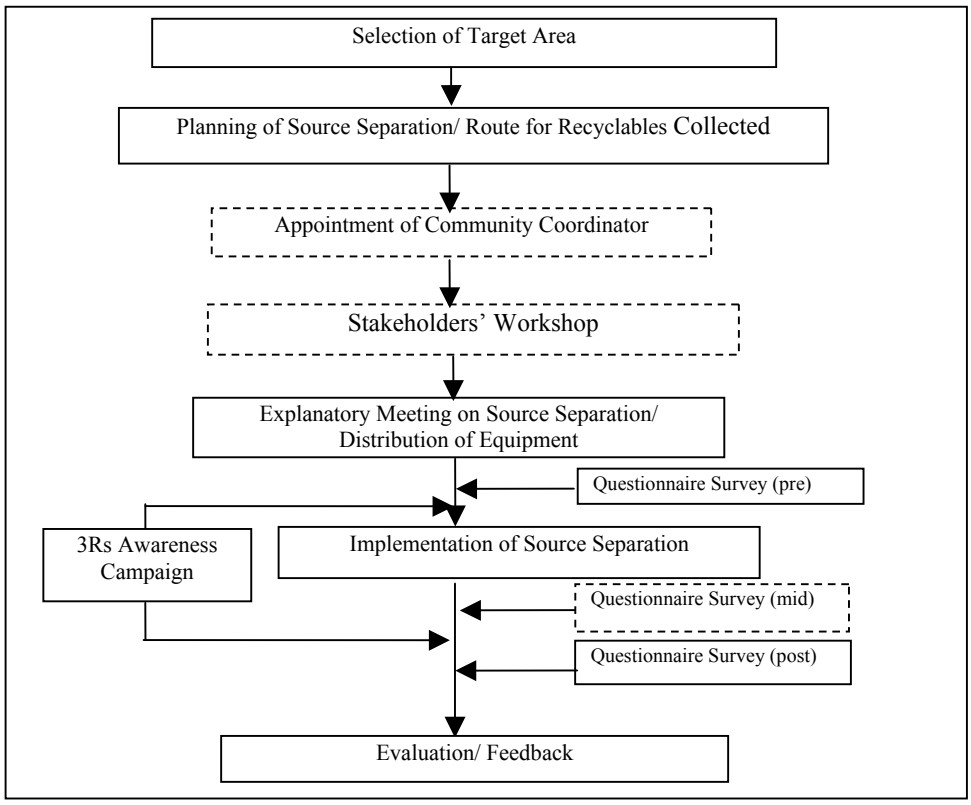


Figure 6.2.2 Flow Diagram for PP-II-2: Source Separation of MSW

Table 6.2.4 Implementation Schedule for PP-II-2

	Activities	Jun	Jul	Aug	Sep	Oct	Nov
1.0	Est. of Source Separation System						
1.1	Selection of target area	□					
1.2	Stakeholders workshop			△			
1.3	Planning of source separation	▬	▬				
1.4	Explanatory meeting		△				
1.5	Implementation of source separation			▬	▬	▬	▬
2.0	Implementation of Campaign for 3Rs				□		
3.0	Implementation of questionnaire survey		□		□		□
4.0	On-the-Job Training	←	- - -	- - -	- - -	- - -	- - - →

6.2.5 Organisation Frame Work of PP-II

Organisation framework for PP-II implementation is as shown in Figure below.

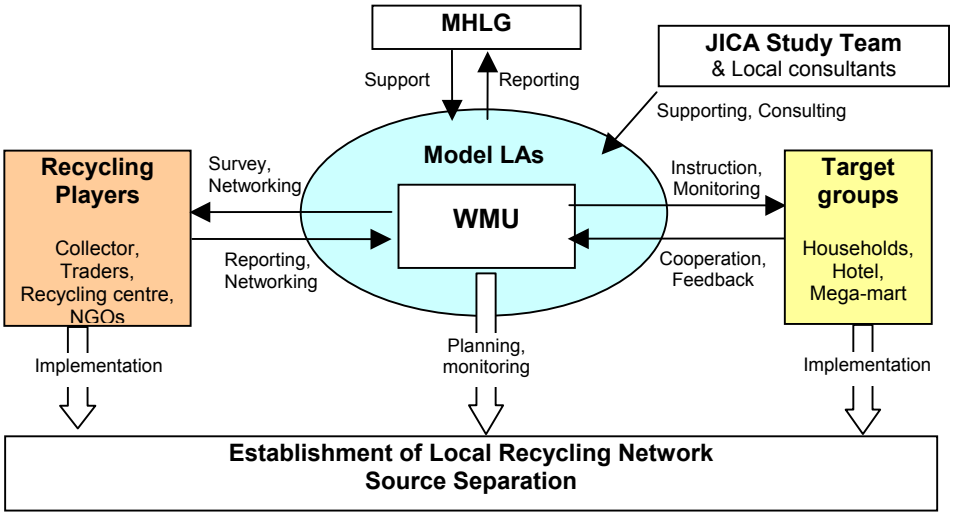


Figure 6.2.3 Organisation framework for PP-II

6.2.6 General Description of 3 Model LAs

This pilot project has been carried out at three (3) model LAs, i.e., Majlis Perbandaran Pulau Pinang (MPPP), Majlis Perbandaran Subang Jaya (MPSJ), and Majlis Bandaraya Miri (MBM). The location of the 3 model LAs and summary of current status of 3Rs activities in each LA are as shown in Figure 6.2.4 and Table 6.2.5, respectively.

Figure 6.2.4 Location of Model LAs

Table 6.2.5 Summary of Current Status of Recycling Activities in the Model LAs

	MP Pulau Pinang	MP Subang Jaya	MB Miri
Area	299.65 Km^2	161.8 km^2	977.43 km^2
Population	575,498 (2000) 667,500 (2004 estimates)	437,121 (2000) 484,925 (2004 estimates)	219,571(2000) 245,600 (2004 estimation)
Total Waste Generation	TBA	445.6 tones/day 0.897 kg/cap/day	235.1 tones/day 0.87 kg/cap/day
Unit responsible for SWM	Special Tasks Unit in the Urban Services Department	Environmental Monitoring Unit under the Health and Urban Services Department	Recycling sub-unit under the Solid Waste Management Unit of the Public Cleansing and Maintenance (PCM) Section
No. of Officer	2 officers	3 officers, 1 administrative staff and 1 support staff.	1 health inspector
Tasks of Responsible Unit	• Give recycling talks to the public, factories and schools • Conduct exhibitions, recycling campaigns • Distribute the three (3) coloured bins	• Plan and implement recycling activities within MPS J, incl. awareness campaigns, recycling buy-back scheme • Compile a list of recyclers in MPSJ area recycling stations located within MPSJ area • Compile recycling data from various recycling centres, Alam Flora and MPSJ collections.	• To monitor and control the management of waste • To provide supports such as carrying out awareness campaign occasionally (MBM)
Local Recycling Network	State government implemented recycling programmes with the help of Penang Environmental Working Group (PEWOG). PEWOG implemented programmes include the community organisation, setting up of networks for recycling agents, etc.	There is an updating problem as the list of stakeholders in MPSJ's recycling network is not current.	There exists no formal network among various stakeholders, nor formal institutional set up to coordinate the recycling agents. A list of recycling agents were printed in the Local Agenda driven "Eco-Pack"
Data Management	MPPP uses its own format to collect data on recycling from registered recycling businesses. The data by the registered (by MPPP) recycling businesses are sent via fax to the WMU and collated, processed and analised.	The compilation of recycling data by the Unit needs a more systematic approach, i.e. data should be kept in a database format for easier tabulation and generation of output.	There exists no structured and regular data collection system. Data related to 3Rs were collected based on ad-hoc request such as from the MHLG, LA 21 Miri etc. Data was compiled and filed in hardcopies while some data were prepared in digital format.

6.3 PP-II-1: ESTABLISHMENT OF LOCAL RECYCLING NETWORK IN MODEL LAS

This section outlines the PP-II-1: Establishment of Local Recycling Network in Model LAs. Article 6.3.1 discusses overall activities and results of PP-II-1, followed by detailed statements for major activities of PP-II-1 in the following articles; i.e. article 6.3.2, 6.3.3 and 6.3.4.

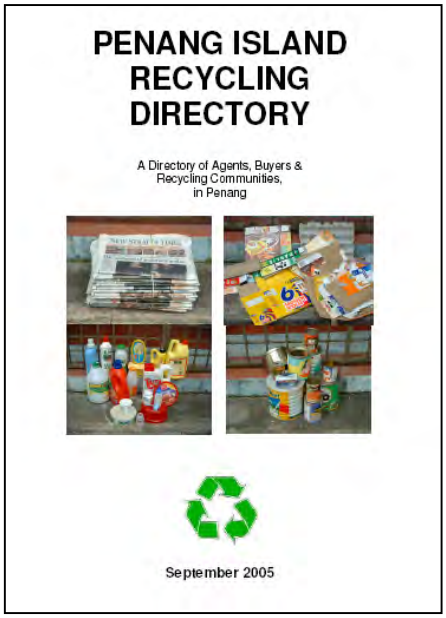
6.3.1 Overall Activities and Results of PP-II-1

Overall activities and results of PP-II-1 in each MPPP, MPSJ and MBM are described as shown in Table 6.3.1. Publications and web-sites prepared under PP-II-1 in each LA are as shown in Plate 6.3.1, Plate 6.3.2 and Plate 6.3.3, respectively.

Table 6.3.1 Activities and Results of PP-II-1

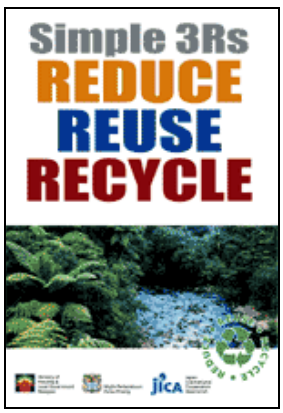
Components	Activities and Results			
	General	MPPP	MPSJ	MBM
Establishment of Waste Minimisation Unit (WMU)	Under PP-II, the WMU was set up under the responsible unit in the model LAs. Computer, printers, phone line, fax as well as broadband internet were procured for the WMU under the project. During the PP period, the WMU was staffed by LAs officers and appointed local consultants, and served as a base of all project activities, liaising with various stakeholders.	WMU was set up under the Urban Services Department in MPPP and 2 officers were appointed.	WMU was set up under the Health and Urban Services Department in MPSJ and main 1 officer and 3 environmental officers were appointed.	WMU was set up under the Public Cleansing & Maintenance (PCM) Section in MBM and 1 key officer was appointed. MBM processing to establish WMU officially.
Waste Flow Survey	A waste flow survey was carried out to establish the baseline information of waste minimisation particularly on recycling in LAs. A questionnaire survey was conducted on the stakeholders operating within and around the LA's administrative area, to identify the waste flow and to obtain relevant information on stakeholders.	Questionnaire survey with interview was carried out for 160 recycle related stakeholders. The current recycling rate is estimated to be about 16%.	Questionnaire was send to 455 players and 104 answers were received. Annual collection amount is estimated as; 70,000 ton for recyclers, 100 ton for recycling centres and 2,600 ton for traders/ middlemen.	38 players were identified and 29 were answered the questionnaire by interview. Approx. 408 ton/month of recyclables are collected and most of them are exported including West Malaysia.
Stakeholders' Workshop	Stakeholders' workshops to improve coordination and collaboration among the stakeholders identified during the survey were carried out in each LA.	Workshop was held 3 Sept. 2005 with 230 attendants from various stakeholders.	Workshop was held 7 Sept. 2005 with 17 attendants from various stakeholders.	Workshop was held 8 Oct. 2005 with 36 attendants from various stakeholders.
Preparation of Stakeholders' Directory	Collected data and information on stakeholders were compiled into a database, "Stakeholders' Directory" aiming at the formulation of network. These directories consist of a list of all the identified recycling agencies, what is 3Rs, location of recycling centres etc.	The Directory listed 106 recycling agents categorised by items to be handled, 70 recycling communities, etc.	The Directory listed 39 recycling agents by types, 95 locations of recycling bins, 10 locations of recycling centres, etc.	The Directory listed 15 recycling agents by types, 57 locations of recycling bins, 10 locations of recycling centres, etc.

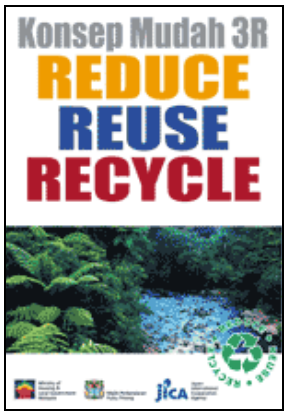
Components	Activities and Results			
	General	MPPP	MPSJ	MBM
Establishment of Data Management System on SWM & 3Rs Activities	Based on the waste flow survey result, a data management system was prepared in Microsoft Excel format as specified by the Ministry of Housing and Local Government under PP-I.	An e-based data collection and management system in line with the new reporting format from MHLG was established.	Data management system has established that encompasses all three aspects, i.e., collection, management and reporting together with the ICT Department.	Data management system in line with the new reporting format from MHLG was established. Three officers are appointed to process data management.
Development of 3Rs Awareness Promotion	3Rs awareness promotions were conducted thorough several kinds of media in each LA, such as awareness brochures, and newspaper, aiming at enhancement awareness on 3Rs among the public.	3Rs awareness brochures in each English, Malay and Chinese (4,000 copies). Website:www.rnumpp.net Regular press releases	3Rs awareness promotion 3Rs awareness brochure in English, Malay and Chinese Website: www.rnumpsj.net	3Rs information leaflet in English and Chinese (1,000 copies). Website: www.miri3r.net.my Regular press releases Radio talk on 3Rs Exhibition at campaigns etc.
On the Job Training	As part of capacity building of LA officers, on-the-job training was carried out throughout the daily activities of pilot project.	Regular OJT activities and capacity building for two (2) LA officials.	Five counterparts from MPSJ were assigned as taskforce members during the pilot project period.	Five counterparts from PCM Section of MPSJ were assigned as taskforce members.

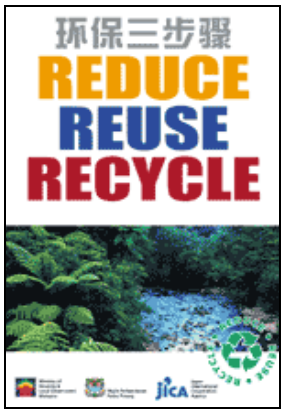


Penang Island Recycling Directory

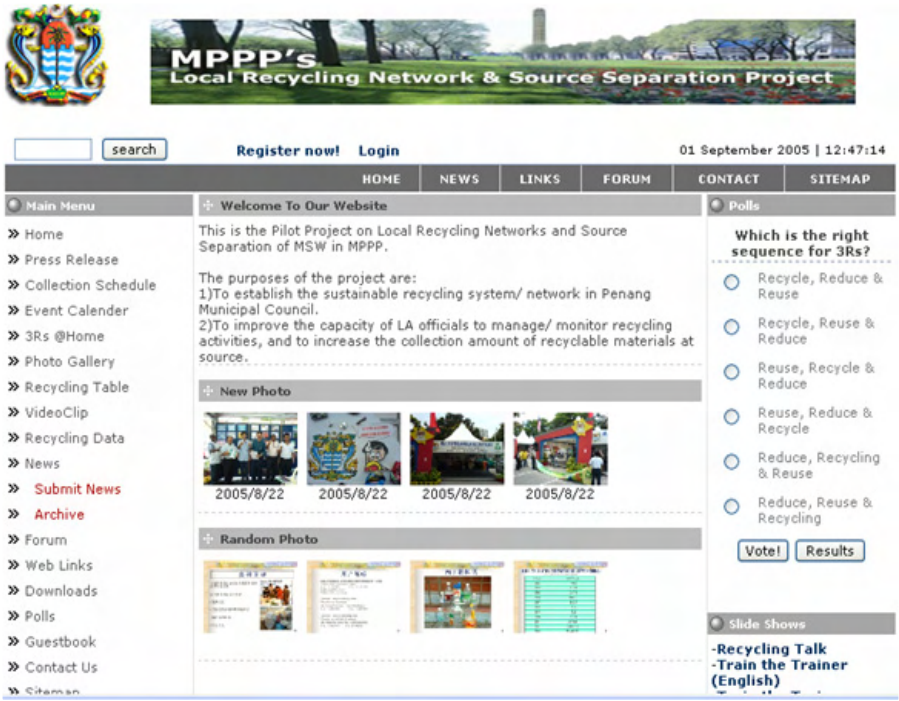
Total of 176 stakeholders are listed.







3Rs Awareness Leaflets
Publishedin three languages (English, Malay and Chinese) and distributed to the public at awareness campaign.



Website on 3Rs in MPPP

Plate 6.3.1 Publication under PP-II in MPPP

MPSJ Stakeholders' Directory
Published in Malay, Total of 39 stakeholders is listed.

3Rs Awareness Leaflets (bottom)
Publishedin three languages (English, Malay and Chinese) and distributed to the public at awareness campaign.

Plate 6.3.2 Publication under PP-II in MPSJ

MBM Draft Eco-pack
Published in cooperation with LA 21 Solid Waste Reduction Working Group.

Total of 15 stakeholders is listed.

Web-site for 3Rs Activities in Miri

Plate 6.3.3 Publication under PP-II in MBM

6.3.2 Establishment of Waste Minimisation Unit (WMU)

WMU was set up under the responsible unit in the model LAs. Necessary equipments including computer, printers, phone line, facsimile as well as broadband internet were procured for the WMU under the project. During the PP period, the WMU was staffed by LAs officers and appointed local consultants, and served as a focal agency of all project activities, liaising with various stakeholders. Tasks for WMU include;

- Data collection/management and reporting
- Implementation of Waste flow survey
- Planning/conducting campaign
- Promotion of networking among stakeholders
- Publication of stakeholders' directory
- Liason with Stakeholders

Outline of WMU set up in 3 model LAs are as follows;

Table 6.3.2 WMU Established in 3 LAs

	MPPP	MPSJ	MBM
Responsible Department	Urban Services Department	Health and Urban Services Department	Public Cleansing & Maintenance (PCM) Section
No of staff appointed	2 officers	1 main officer and 3 environmental officers	1 key officers

6.3.3 Waste Flow Survey

A waste flow survey was carried out in order to identify the waste flow and to obtain relevant information on stakeholders as baseline information of waste minimisation particularly on recycling in LAs. A questionnaire survey was conducted on the stakeholders operating within and around the LA's administrative area. Questionnaire form is attached in Appendix 6. The survey results of each LA are as described below;

(1) Waste Flow Survey in MPPP

Waste flow survey was conducted on the total of 160 stakeholders as shown in Table 6.3.3. Waste flow diagram identified through the survey is as shown in Figure 6.3.1. It was identified that 84% of the waste generated goes to the Pulau Burung Sanitary Landfill site, whilst 16% is diverted for resource recovery and recycling in MPPP.

Table 6.3.3 Number of Targeted Stakeholders in MPPP

Category of Stakeholders	Number
Centres	38
Traders	35
Recycling Centres/Station	23
Manufacturers	12
Households	52
Total	160

Table 6.3.4 Amount and Composition of Recyclables Collected in MPPP

Types of Recyclables	Total (tonnes/year)	Composition (%)
Newspaper	11,683,065	26.50%
Cardboard	26,662,107	60.47%
Plastic	3,000,517	6.80%
Scrap metal	1,739,366	3.94%
Aluminum	187,503	0.43%
Bottle/glass	778,847	1.77%
Clothes	41,763	0.09%
Total	44,093,168	100

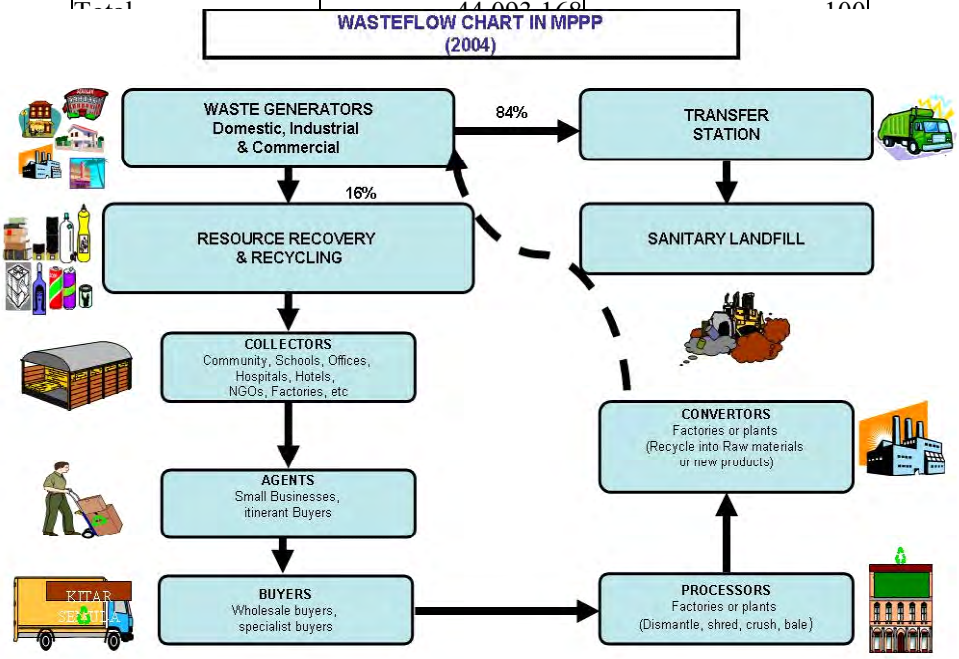


Figure 6.3.1 Waste Flow Diagram in MPPP

(2) Waste Flow in MPSJ

Waste flow survey was conducted targeted to 455 stakeholders as shown in Table 6.3.5. Based on the answer from those stakeholders, waste flow diagram in MPSJ was identified as shown in Figure 6.3.2.

Table 6.3.5 Number of Targeted Stakeholders in MPSJ

Category of Stakeholders	Number
Recyclers	52
Recycling Centres	10
Traders, Middlemen and Collectors	32
Manufacturing Industries	48
Commercial Establishments & Offices	143
Households	170
Total	455

Note: * included in Paper

Table 6.3.6 Recyclables Collected in Average by Type and Stakeholder in MPSJ

(tonnes/year)

Type of waste	Recyclers	Recycling Centres	Traders & Middlemen
Paper	8,676	44	1,136
Cardboards	12,120	41	556
Newspaper	19,080	*	*
Aluminium & Metal	9,240	5	708
Glass	12,288	6	-
Plastics	3,164	4	249
Rubber	6,000	-	-

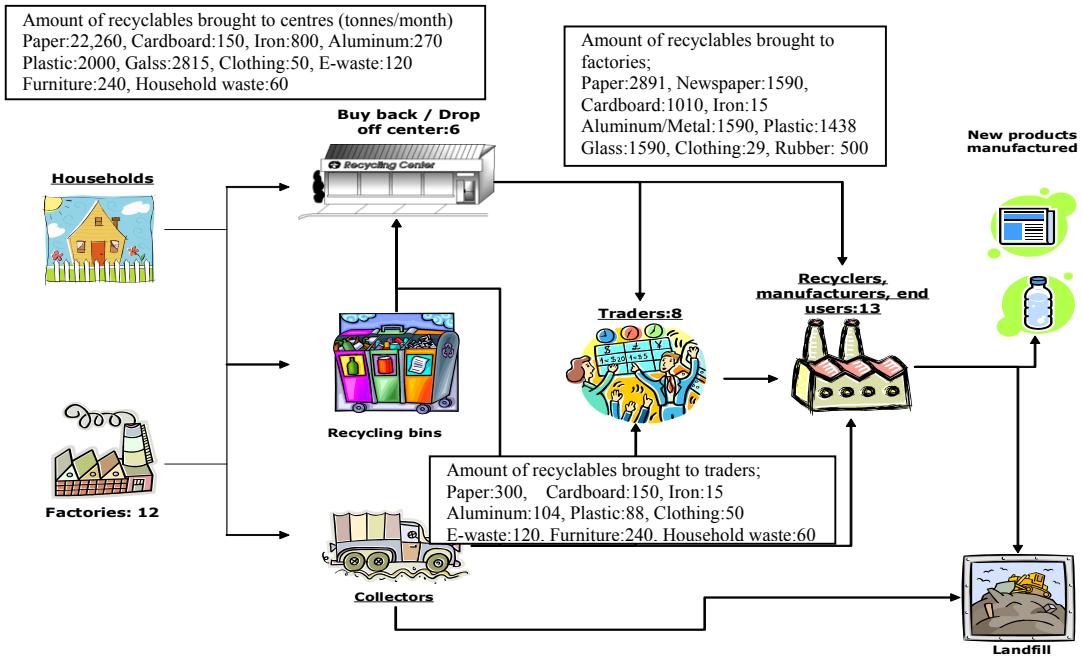


Figure 6.3.2 Waste Flow Diagram in MPSJ

(3) Waste Flow in MBM

Waste flow survey was conducted targeted to 38 stakeholders as shown in Table 6.3.7. The number of private recycling players identified in MBM through the survey was twenty (20). Waste flow diagram in MBM was identified as shown in Figure 6.3.3.

It was found that only one manufacturer who accepts plastic waste directly for recycling exists in MBM. For all other traders, collected recyclables need to be transported to West Malaysia or overseas for further processing and recycling.

Table 6.3.7 Number of Targeted Stakeholders in MBM

Category of Stakeholders	Number
Trader/Middle men	15
Recycling Station/ Centre	17
Manufacturer who accept recyclables	1
Scavenger	3
Total	36

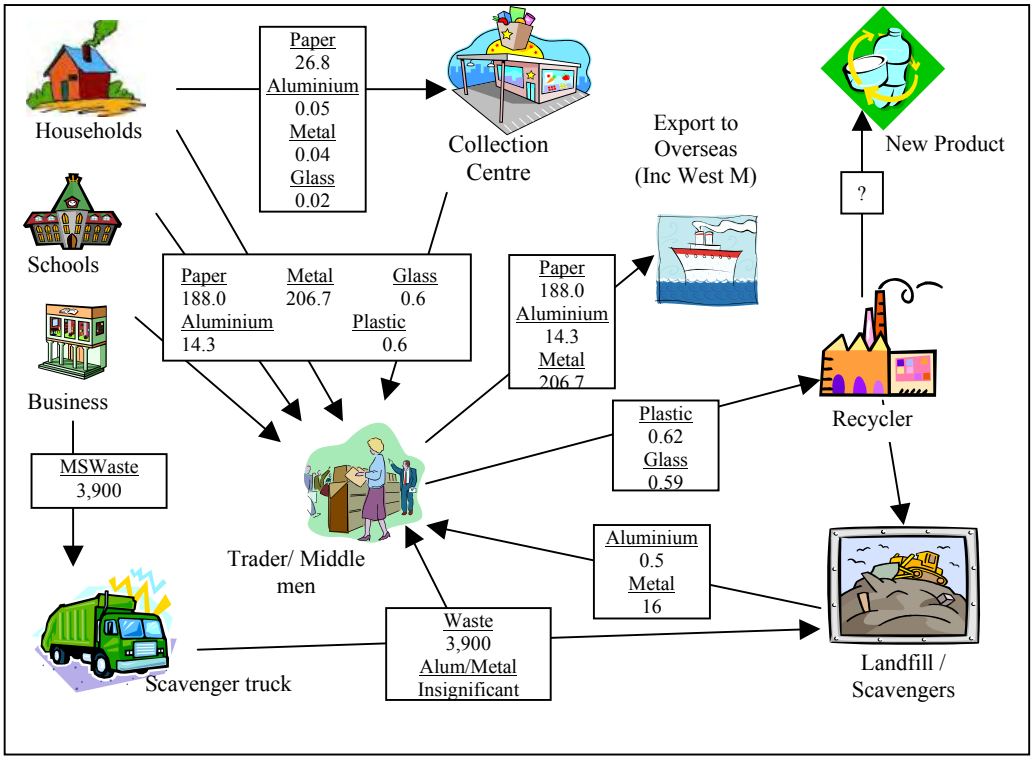


Figure 6.3.3 Waste Flow Diagram in MBM

(4) Factors Affecting to Promote Recycling Activities

In addition to the amount and flow of recyclables collected, factors affecting to promote recycling activities were also surveyed for three (3) types of recycling players; i.e. recyclers, recycling stations and traders/ middlemen. Table 6.3.8 shows the results of the survey in MPSJ and MBM.

In MPSJ, recyclers and traders pointed out that "*difference in price between virgin materials and recyclable materials*" and "*quantity of recyclable materials supplies*" will be critical conditions to promote recycling, while recycling station and trader pointed "*market demand of recycled products*" is important. In MBM, the first two items were indicated to be important conditions.

Table 6.3.8 Factors Affecting to Promote Recycling Activities

Factors	Over Total Respondents (%)				
	MPSJ			MBM	
	Recyclers	Recycling Station	Trader/ Middleman	Recycling Station	Trader/ Middleman
Difference in price between virgin materials and recyclable materials	46.2%	16.7%	50.0%	24%	32%
Quantity of recyclable materials supplied	46.2%	0.0%	62.5%	27%	28%
Market demand of recycled products	38.5%	50.0%	75.0%	19%	12%
Quality of recyclable materials supplied	30.8%	33.3%	25.0%	24%	12%
Awareness of the company in recycling	30.8%	66.7%	0.0%	3%	16%
Other factors	30.8%	33.3%	12.5%	3%	0%

6.3.4 Stakeholders' Workshop

Stakeholders' workshops were conducted in each model LAs in order to collaborate among the stakeholders identified during the survey. In the workshop, components of PP-II were briefed to the stakeholders, followed by the round-table discussion among the participants to obtain more information of the stakeholders, to exchange views to promote recycling further and to clarify the role of each player.

(1) Stakeholders' Workshop in MPPP

Stakeholders' Workshop was held on 3 September 2005, having 230 attendants from recyclers, NGOs, CBOs, households, LA officers, school teachers/ students, private companies, hospitals etc. During the workshop, components of PP-II were presented, followed by the group discussion on how to promote waste minimisation. Through the group discussion followed by the group presentations, participants exchanged the ideas for what they can do for 3Rs, and reconfirmed their role and responsibilities.

(2) Stakeholders' Workshop in MPSJ

Stakeholders' workshop was held on 7 September 2005, 17 people (7 from recyclers, 2 from manufacturing industries, 6 from traders, and 2 from residents association) attended the workshop. Recycling activities in MPSJ and the component under PP-II were presented to the stakeholders, followed by a round table discussion. Main findings highlighted in the workshop are summarised as follows:

- Project is good for MPSJ as it can provide stakeholders an avenue to give constructive ideas as well as a communication tool. However, respondents indicated that any programmes or activities should be done consistently for it to be sustainable;
- The current recycling situation in MPSJ is good but also stated that there is a lot of room for improvement. Areas that need to be strengthened are as follows:
  - Involvement of NGOs in recycling activities should be encouraged;
  - Create more awareness in recycling activities amongst residents; and
  - Strengthen data collection and networking amongst traders and recyclers.
- MPSJ must play a more aggressive role in assisting traders and recyclers to implement recycling programmes and activities in their area. MPSJ must also assist stakeholders by providing publicity as well as permit approvals for programmes and campaigns without much red tape.
- MPSJ should concentrate on awareness campaigns to households and schools on source separation projects.

(3) Stakeholders' Workshop in MBM

Stakeholders' workshop was carried out on 8 October 2005, having 36 attendances including recyclers, school teachers, government officers, and NGOs etc. During the workshop, briefing on PP-II and presentation of 3Rs experience at school were conducted followed by the presentation and discussion on the stakeholders' directory. In the workshop, MPPP officers were invited and presented experience in MPPP to enhance the capacity of MBM officers. Main findings highlighted in the workshop are as follows:

- To improve networking, it is suggested to involve stakeholders through the existing forum e.g. LA21 Solid Waste Reduction Group, Miri. Incorporated as examples;
  - Regular awareness campaigns or meetings;
  - Identify champions to lead the networking and drive for waste minimisation;
  - To establish suitable channels / forums for public to voice their comments/ suggestions.
  - The setting up of a local recycling network in MBM will bring benefits to most of the stakeholders, as follows;
  - Greatly improve the awareness and knowledge of stakeholders on 3-R in Miri
  - Easier for MCM to control, coordinate and monitor the various players involved
  - Create opportunities to strike win-win cooperation among the stakeholders
- There are constraints facing 3Rs activities and future networking, for example;
  - Financial resources to implement and manage
  - Human capacity to implement – suggested to identify and involve specialist
  - Limited storage space for recyclables

6.4 PP-II-2: Source Separation of MSW

6.4.1 Component of PP-II-2

Under PP-II-2, source separation was introduced in several target areas in the model LAs. In the planning process of PP-II-2, JICA Study Team was requested from MHLG that targets for source separation should be selected from variety of groups, and should not only be households. After a number of meetings with local consultants and the model LAs, MPSJ complex, South City Plaza in MPSJ, and Dynasty Hotel in Miri were selected additionally as target groups for source separation project.

Table 6.4.1 shows outline of source separation system established and implemented in each target area under PP-II-2.

Table 6.4.1 Outline of Source Separation System Implemented Under PP-II-2

Target Groups	Site	Activities	Target Items	Equipments	Collector	Frequency
Terrace house	MPPP	Door to Door collection	Paper, Plastics, Metals, Glass	1 HDPE bin *2 separation	Private recycler	1 time/week
	MBM	Door to Door & Station Collection		1 plastic bag & boxes for papers *3 separation	NGO	1 time/ fortnight
					Garbage Contractor	1 time/week
Apartment	MPSJ	Station Collection		3 plastic bags & containers *4 separation	Private recycler	1 time/week
MPSJ Office Complex	MPSJ	Reduction of paper consumption	Paper	3 recycling bins	Alam Flora	1 time/ week
Mega-mart	MPSJ	Est. of buy-back centre	Paper, Plastics, Metals, Glass	Cabin	Alam Flora	Everyday
Hotel	MBM	SS by housekeeper & Guests		Recycling bins/ bags/ boxes	Private recycler	1 time/month

To capture the change in awareness on 3Rs among the public, questionnaire survey on awareness was undertaken targeting households in the 3 model LAs.

Flow diagram of PP-II-2 is shown in Figure 6.4.1.

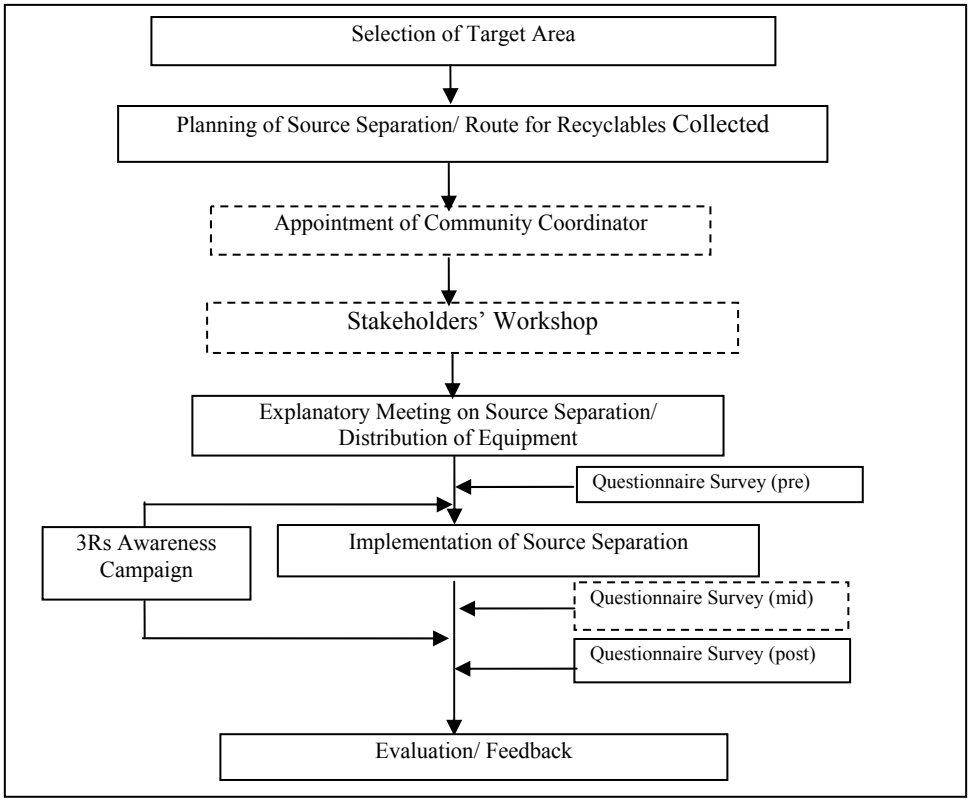


Figure 6.4.1 Flow Diagram for PP-II-2: Source Separation

6.4.2 Source Separation for Households (MPPP, MPSJ, MBM)

(1) Description of Target Area and Existing Recycling Activities

Based on the following selection criteria, one residential area in each of the 3 model LAs was selected as target area for the Pilot Project. General information and existing condition of waste disposal at the target area are as described in Table 6.4.2.

<Major Components of Selection Criteria >

- Types of houses, religious belief, racial mix,
- Accessibility to location
- Relevance to LA's 3Rs programme
- Presence of "Champion (local leader)"
- Cooperativeness and willingness of residents
- Presence of willing waste collector and recycling agent
- Past experience in recycling

Figure 6.4.2 shows current status of source separation activities in the target area identified by the awareness survey conducted before the implementation of the Pilot Project. It can be observed apparent difference among areas.

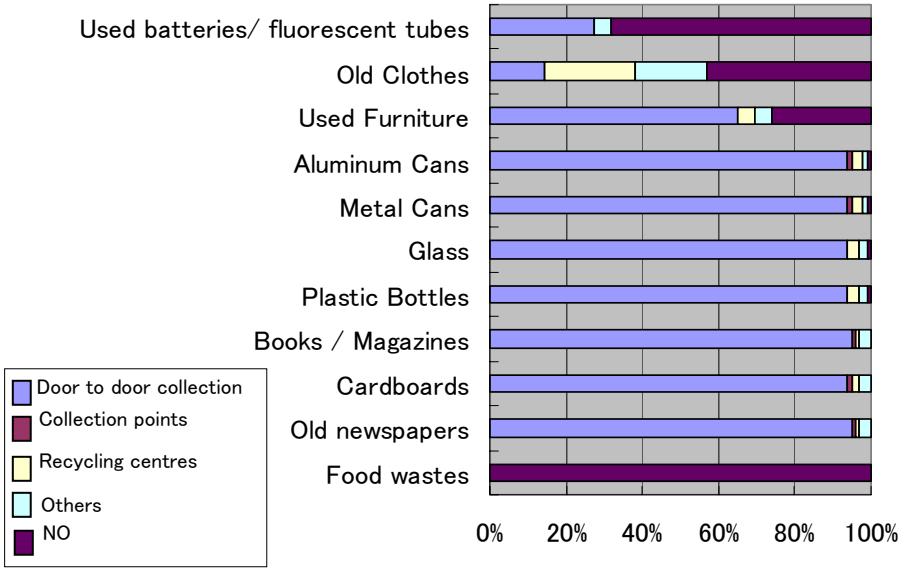
Table 6.4.2 Description of the Target Area

	MP Pulau Pinang (MPPP)	MP Subang Jaya (MPSJ)	MB Miri (MBM)
Name of Place	The Hillside Residential Area in Tanjung Bunga	De Palma Condominium	Krokop 10 area, Krokop 6 ara,
No. of Household	409 including 12 shop houses	288 units	184 (Krokop 10) 104 (Krokop 6)
Type of house	Terraced house	Apartment	Terraced house
Existing Condition of Waste Disposal/ Collection	Mixed wastes from individual houses and shop lots were collected door-to-door every alternate day by the private waste collector. All house hold and commercial waste were placed in an 80 litre HDPE green bin provided by the MPPP. Recycling activities were carried out informally. Recyclables separated individually were brought to recycling centres or Itinerant buyers.	Mixed wastes from tenants were brought down to the central collection point located in front of Block B, and collected every day by Alam Flora. Four (4) smaller garbage bins are located near each block. Newspaper and other papers were separated and workers employed by the apartment management company were collected door-to-door. But this was not formal recycling activities.	Mixed wastes from individual houses were collected three times per week by garbage contractor. Recycling activities was carried out irregular. A NGO, Buddhist Tzu Chi Merit Association collected the recyclables around twice a year. There were three recycling centre in public places within Krokop area, i.e. market and park, but those were not utilised, or just opened and have not been operated.

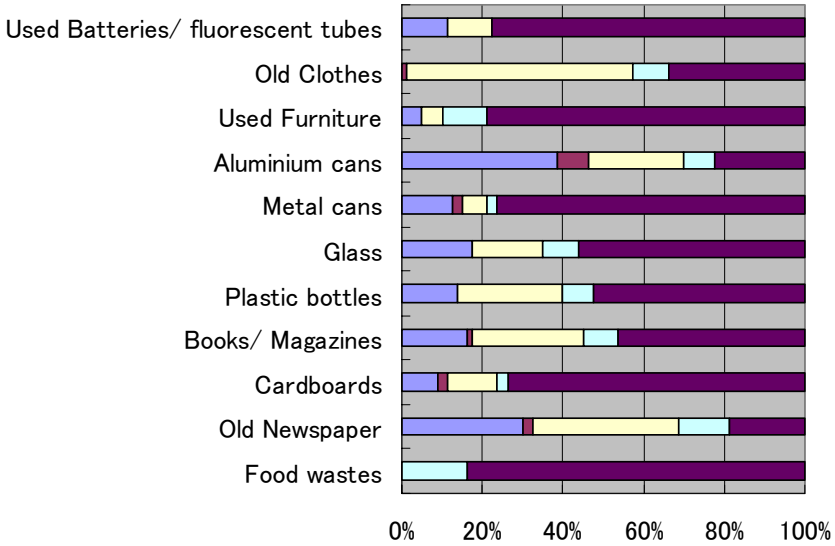
Houses and shops at Tanjung Bunga, MPPP

Houses at Krokop 10 (left) and 6 (right).

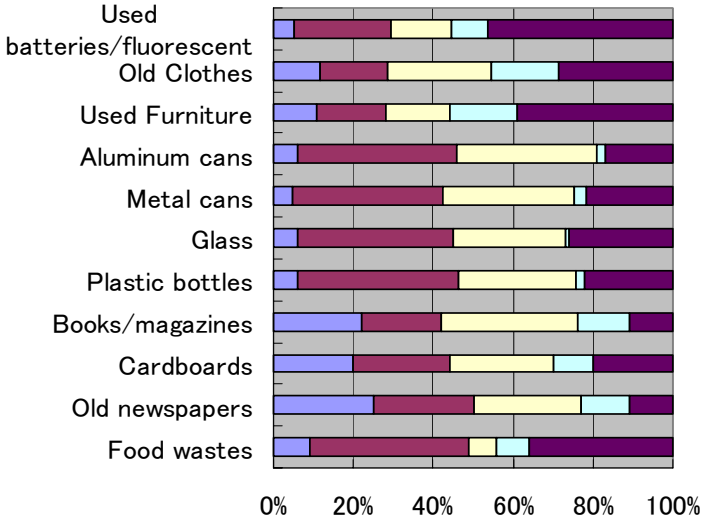
Plate 6.4.1 Target Area for Source Separation



<MPPP>
Most of people have already been practicing source separation for most of items with door to door collection. However, food wastes are not being recycled in MPPP.



<MBM>
The levels of practicing source separation very much differ in items. Old clothes and aluminum cans and old news papers shows high practicing ratio. Recycling centres are used more frequently than in MPPP. Curbside collection is seldom operated.



<MPSJ>
In MPSJ, separation at source is being implemented for all the items listed in the questionnaire. As residents live in apartments in this area, station collection is more familiar to them than door to door collection.

Figure 6.4.2 Households Undertaking Source Separation

Source: Pre Pilot Project Waste Flow Survey

(2) Source Separation Practice in MPPP

1) Implementation Procedure in MPPP

Activities implemented under PP-II-2 are summarised in Figure 6.4.3.

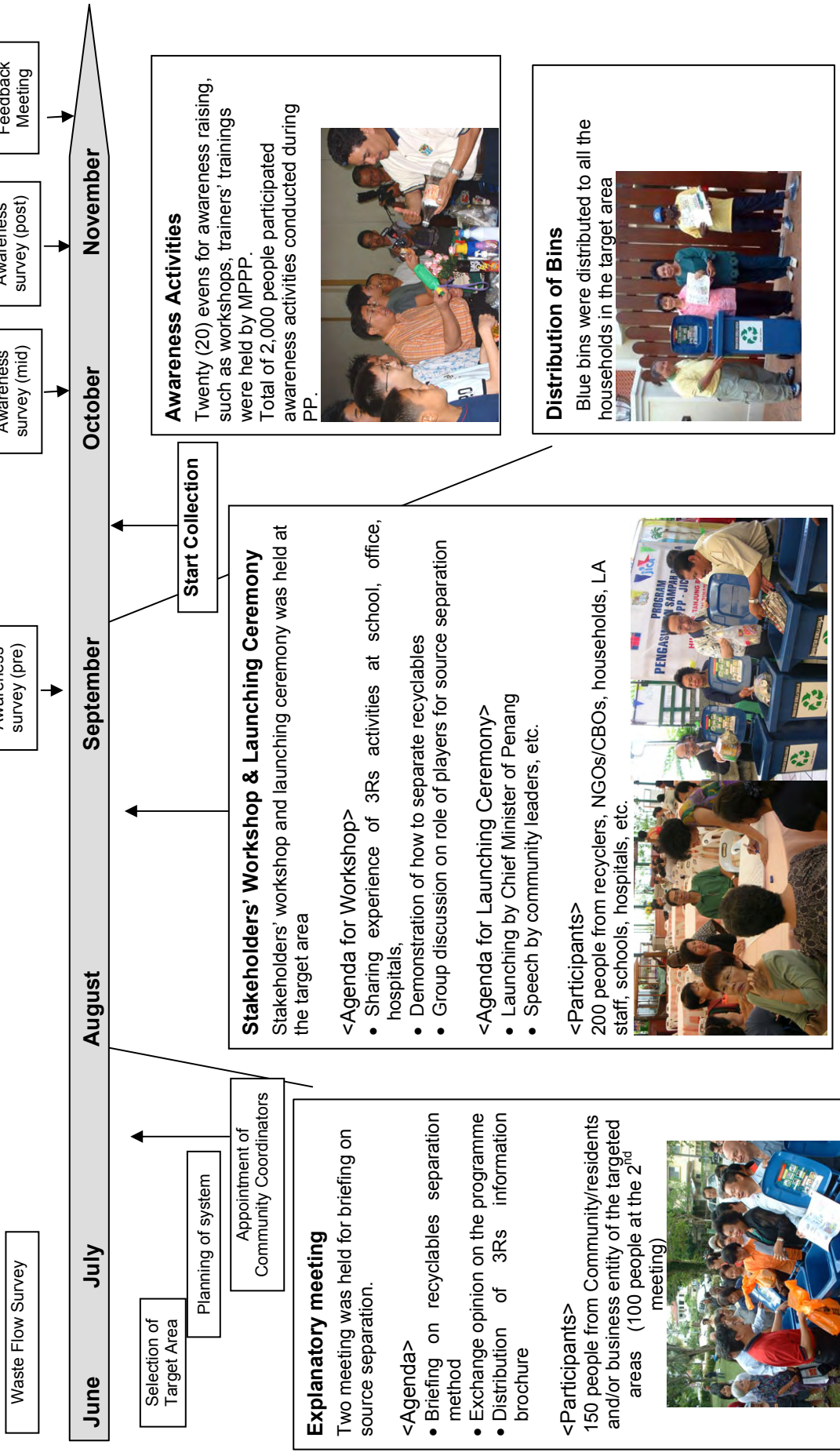


Figure 6.4.3 Implementation Procedures for PP-II-2 in MPPP

2) Source Separation System Introduced in MPPP

Source separation system set up and tested in MPPP is as described in the Table below.

Table 6.4.3 Source Separation Method in MPPP

Item	Contents
Collection Method	Door-to-door collection No permanent collection station set up in the area due to lack of suitable place.
Target Items	Paper, Plastics, Metals, Glass
Frequency	• 3 times per week for organic waste by existing waste collector • Once a week for recyclable items by an appointed recycling agent.
Equipments for source separation	• Organic waste: Green bins distributed by MPPP in early time • Recyclables: HDPE blue colored bins with waterproof stickers (distributed under this project) • No plastic bag was provided to the participating households. Residents use own plastic bags they got from the supermarket, etc.
Segregation method	2 Separation : Organic waste, Non-organic (recyclables) Residents separate recyclables from wastes, put in plastic bags by items and store in blue bin. Bulky items can be placed outside the blue bins.
Collector	Landcarve Enterprise (private recycler) The recycling agent plays a jingle during his rounds in the project area to create a festive mood and also announce the arrival of the recycling truck.
Collection Fee	No additional fee for collection (agents bear all the cost)

Blue Bin (for recyclables) and Green Bin(for Organic)

Residents put recyclables in a bin

Bring bins to the front of the gate on collection day

Appointed collector collects recyclables from blue bins

Plate 6.4.2 Source Separation Practice in MPPP

3) Collection of Recyclables

During the period from 14 August to 16 October 2005, recyclable collection was carried out 10 times. The quantity collected ranged from a low of 369 kg to a high of 865 kg per week. The average weekly collection amount was 487 kg. The amount of recyclables collected on each collection day is as shown in Table 6.4.4.

The source separation activities in Hillside area showed rather high participation ratio, between 23-35 %. The participation rate is calculated as the number of participating households at each collection day divided by the number of households that received the blue bins.

To raise participation ratio further, and to announce this activities to the public, several efforts were made, including workshops, launching of pilot project and 3Rs campaigns. Feedback meetings were also organised for the residents in Hillside area, in order to discuss the countermeasure to issues encountered during the project period. These meetings were very efficient to get residents more interested and involved in the project.

Table 6.4.4 Amount of Recyclables Collection in Hillside Area

(Unit: kg)

	14 Aug	21 Aug	28 Aug	4 Sep	11 Sep	18 Sep	25 Sep	2 Oct	9 Oct	Total
Paper	280	180	85	82	70	260	320	130	201	1,608
OCC	70	22	60	45	28	50	89	63	48	475
Glass	280	70	200	108	95	120	278	170	110	1,431
Plastic	88	55	102	60	60	60	83	78	61	647
Alumi-nium	15	7	8	5	5	7	8	5	28	88
Ferrous Metal	28	35	40	28	48	70	72	42	24	387
E-waste	0	0	0	45	0	15	15	28	8	111
Total	673	314	393	313	246	582	865	516	480	4,382
Participa tion Rate (%)	N.A	28	33	26	27	26	28	23	27	(Ave.) 24

Source: JICA Study Team Note: OCC:cardboard

(3) Source Separation Practice in MBM

1) Implementation Procedure in MBM

Activities implemented under PP-II-2 in MBM are summarised in Figure 6.4.4.

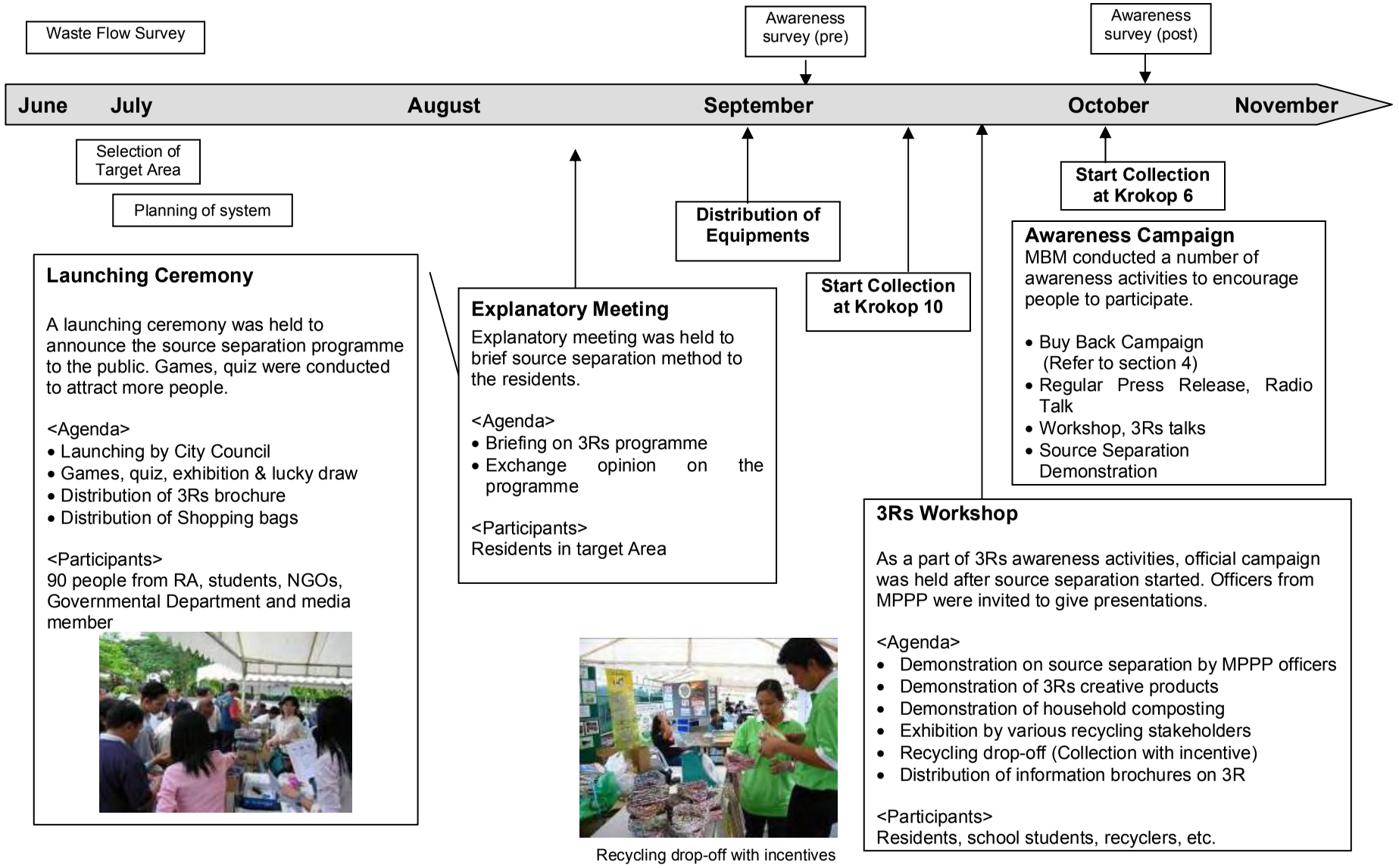


Figure 6.4.4 Implementation Procedure of PP-II-2 in MBM

2) Source Separation System Introduced in MBM

Source separation system set up and tested in Miri is as described in Table below.

Table 6.4.5 Source Separation System in Miri

Item	Contents	
Collection Method	Door to door collection and station collection	
Target Items	Paper, Plastics, Metals, PET bottles	
Target Area	Krokop 10 (184 households)	Krokop 6 (104 households)
Duration	4 months (Aug-Nov)	2 months (Oct-Nov)
Collector	NGO(Buddhist Tzu Chi) and MBM (collect by turns)	Garbage contractor appointed by City Council "Piggy Back" on normal rubbish route
Collection Frequency	<Door to door collection> • 3 times per week for organic waste by garbage contractor • Every 2 weeks (Sunday morning from 8am until 11am)	<Door to door collection> • 3 times per week for organic waste by garbage contractor • Once a week (Saturday) for recyclable items
	<Station collection> Every weekend at 2 drop-off centres	
Segregation method	3 Separation : Organic waste, Used papers (Newspapers, black & white papers, magazines), Other recyclables Residents separate recyclables from wastes and put in plastic bags (papers are put in a cardboard box). Recyclables are brought to outside on the collection day, and collected by garbage contractor/NGO. Residents can bring to drop-off station managed by NGO in their good time.	
Equipments for source separation	• Organic waste : bins • Recyclables : Collection boxes (carton box) (distributed under this project) • Used papers: Plastic bags (distributed under this project)	
Collection Fee	No additional fee for collection	

ere distributed. Residents were asked to put
and pass to collector on the collection day.

Collection by NGO (left), LAs(middle) and Collection Contractor(right)

Plate 6.4.3 Source separation Practice in MBM

Apart from door to door, the drop-off collection points were operated in parallel, as alternative for public to recycle their waste. The identified centres include:

Table 6.4.6 Drop-off Collection Points for PP

Place	Management	Activities
Krokop 5	Buddhist Tzu Chi	Drop-off collection on Sunday from 11:00 am-12:00 pm
Krokop Market – LA 21 collection centre & car park	-	Used as storage point and the venue for regular awareness campaigns
Bulatan Park	Buddhist Tzu Chi	Drop-off collection on Sunday from 11:00 am-12:00 pm

One of the centres (Bulatan Park collection centre) had been beautified to improve the attractiveness under this pilot project (see pictures below).

Plate 6.4.4 Bulatan Park Collection Centre Before & After Painting Beautification

3) Collection of Recyclables

(a) Door-to-door collection

Initially, source separation programme was implemented at Krokop 10 with targeted households of around 200. However, the programme faced the problem of low response even in the middle of pilot project, it was decided to test additional source separation collection system and expand pilot area. Krokop 6 (nearby Krokop 10) was selected additionally in October 2005 as an extension of pilot project area. House types and racial, religious, academic mix of residents in Krokop 6 are similar to those in Krokop 10.

To increase residents' response, several awareness activities were carried out continuously, including regular press release on 3Rs activities, radio talk, exhibitions and 3Rs talk campaign, etc. MBM and the Study Team also made a big effort to identify the "Champion" for the pilot project, who can lead and encourage residents to participate. House-to-house visiting and source sorting activities were done together with Champion, which also increased the amount of recyclables collected and participation rate.

During the pilot project period (July to November 2005 for Krokop 10, and October and November for Krokop 6), recyclable collection was carried out 7 times in each area. Average amount of collected recyclables at Krokp 10 and 6 are 1,355kg/time and 68

kg/time, respectively. Amount of recyclables collected and participation rate in Krokop 10 and 6 are as shown in Table 6.4.7 and Table 6.4.8, respectively. Overall, average monthly participation rates at both areas were gradually increased.

Table 6.4.7 Amount of Recyclables Collected in Krokop 10

(Unit: kg)

Type of recyclables	31 Jul	28 Aug	11 Sep	25 Sep	09 Oct	30 Oct	27 Nov	Total
Newspaper	3,208	315	159	1,394	347	1653	800	7876
Others paper	340	0	9	208	47	213	600	1418
Glass bottles	10	0	8	10	4	20	8	60
PET mineral water bottles	10	1	4	6	8	9	9	47
Aluminium cans	5	2	0	0.3	0	3	0	10
Clothing/ Textile	50	0	7	0	5	5	10	77
Battery	0	0	0	0	3 pieces	0	0	0
Total (kg)	3,623	318	187	1618	411	1903	1,427	9,487
Participation Rate (%)	28.5	2.9	19.8		25.4		13.1	(Ave.) 17.9

Table 6.4.8 Amount of Recyclables Collected in Krokop 6

(Unit: kg)

Type of recyclables	08 Oct	15 Oct	22 Oct	29 Oct	12 Nov	19 Nov	26 Nov	Total
Newspaper	9	37	0.2	67	9	0	14	136
Others paper	19	38	22	120	45	4	31	278
Glass bottles	3	4	11	11	3	0	2	34
PET mineral water bottles	0	0.3	3	2	3	0	0	8
Others plastic containers	1	0.2	2	3	1	2	1	10
Aluminium cans	0	0	0.1	0.2	0.6	0	0	1
Clothing/ Textile	0	0	0	0	0	0	0	0
Metals	3	0.4	3	0	2	4	0	12
Battery	0	0	0	0	0	0	0	0
Total (kg)	35	79	41	203	64	10	48	479
Participation Rate (%)	14.5				7.6			(Ave.) 11.1

(b) Collection Centres

For collection centre, Krokop 5 and Bulatan Park collection centre operated during every Sunday morning from 11am to 12pm. The total amount of recyclables collected at the Krokop 5 Collection Centre during pilot project period was 3,164 kg. Newspaper accounts for a 65 % of those recyclables collected.

(c) Buy back Campaign

Under PP-II-2 in Miri, an incentive campaign was conducted to encourage more people to separate and bring their recyclables, and achieved successful outcome.

On 26 November 2005, 3Rs Campaign with car parking coupons as an incentive was organised at Market Krokop 10. Car parking coupons were distributed based on the

equivalent "buy-back" price set by recycling collectors. The response to this campaign was overwhelming, attracting 387 participants that exchange recyclables with 1000 books of car parking coupon. Around 30 metric tonnes of recyclable items were collected in that day which is around 10% of average total recyclables (including commercial and industrial) collected in Miri with one day of campaign. MBM officers decided to continue this campaign, and 3 campaigns have already been successfully implemented.

(4) Source Separation Practice in MPSJ

De Palma Condominium was selected as target residential area in MPSJ.

1) Implementation Procedure in MPSJ

Activities implemented under PP-II-2 in MPSJ are summarised in Figure 6.4.5.

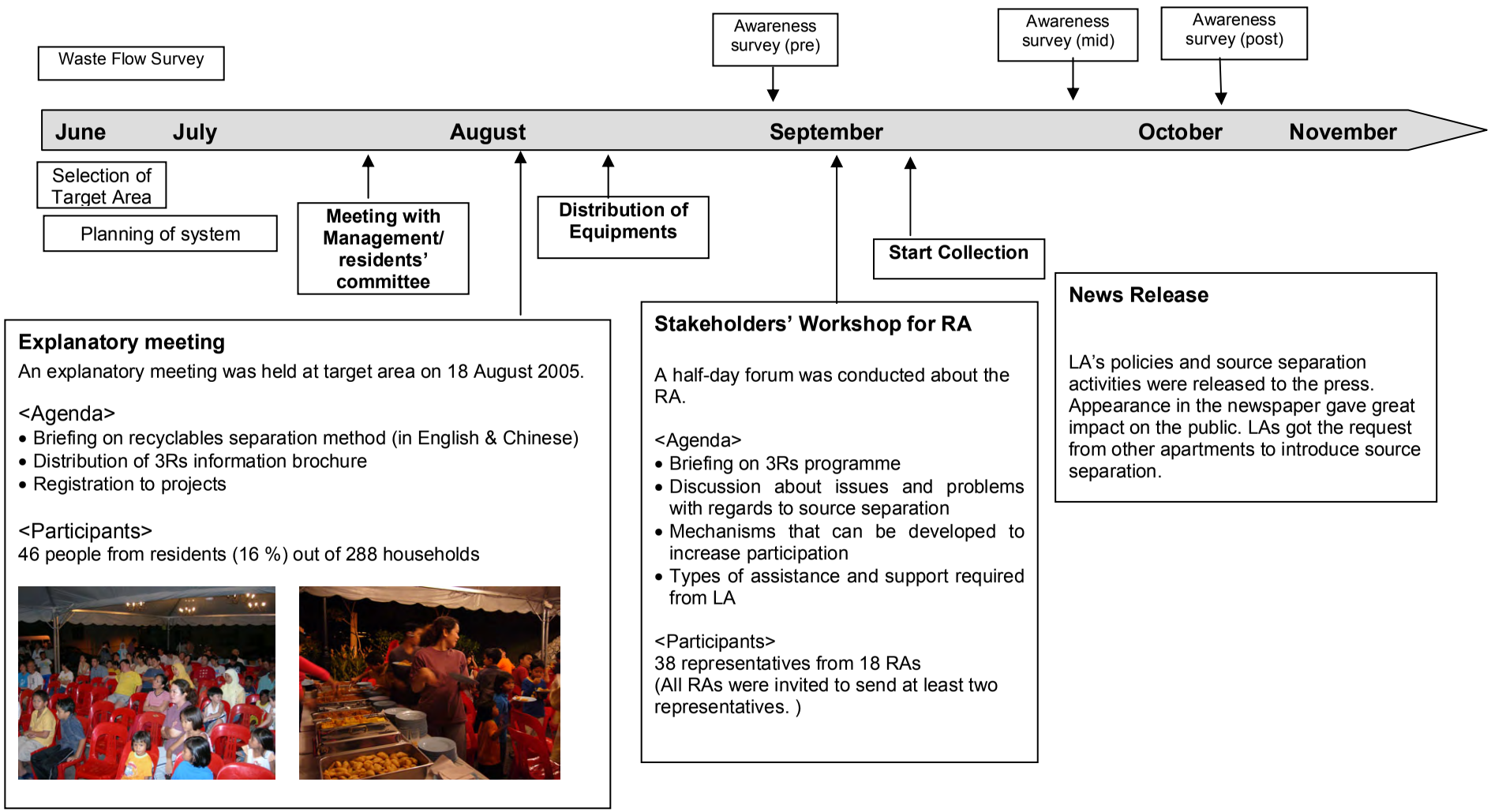


Figure 6.4.5 Implementation Procedure for PP-II-2 in MPSJ

2) Source Separation System introduced in MPSJ

Source separation system set up and tested in MPSJ is as shown in Table below.

Table 6.4.9 Source Separation System in MPSJ

Item	Contents
Method tested	Station collection
Target Items	Paper, Plastics, Metals
Duration	8 weeks
Collection Frequency	• Everyday at 10 am for organic waste by Alam Flora • Once a week for recyclable items by an appointed recycling agent.
Equipments for source separation	• Large Recycling Bins (4 bins are placed within condominium premises) for recyclables (newly introduced) • 3 coloured plastic bags with name tags were distributed for separation • Store room (1 /block) for non recyclables
Segregation method	4 Separation: Organic waste, Used papers (News papers, black & white papers, magazines), Plastics (bottle, packaging, etc.), Metals(aluminium cans, ferrous cans, etc.) Residents separate recyclables from wastes and put those in plastic bags which are distributed under PP, then discharge the recyclables into recycling bins. Appointed recycling agent come to the Condo to collect recyclables. The private collector paid an agreed amount for the collected recyclables to the management.
Collector	Private recycling agent
Collection Fee	No additional fee for collection

Collection container and signboard placed at 4 collection points within De Palma Condo

Residents are requested to put recyclables in plastic bags and bring to the containers.

Signboard at the Apartment

Collection service by appointed recycling agent

Plate 6.4.5 Source Separation Practice in MPSJ

3) Collection of Recyclables

Implementation of the pilot project in D'Palma Codo was delayed, due to the transfer of the apartment management committee from the developer to the residents' committee, and the related internal circumstances. After the official change of management, the project was carried out under the leadership and coordination by the management committee and protem committee.

Due to the low response, a house-to-house canvassing was undertaken during the pilot period. This was done together with representatives from the management committee and protem committee whereby, each household was visited and a project briefing was delivered. This increased the participation rate by another 22 households. Furthermore, MPSJ issued press release on the project to the newspaper. This appearance in the newspaper encouraged the participating residents, and contributed to the increase in the participation rate.

Average amount of recyclables collected during the project period was 456 kg/time. Both of amounts of recyclables collected and participation ratio have increased over the duration of the pilot project (see Table 6.4.10). This indicates that more households were getting aware on source separation during project period.

Table 6.4.10 Amount of Recyclables Collected in De Palma Condominium

(Unit: kg)

Type of recyclables	24 Sep	1 Oct	8 Oct	15 Oct	25 Oct	5 Nov	11 Nov	1 Dec	Total
Paper	330	277	192	No Collection	244	No Collection (Hari Raya Puasa)	563	471	2,077
Plastics	31	23	55		62		125	125	421
Metal & Glass	14	20	30		27		69	76	236
Total (kg)	375	320	277		333		757	672	2,734
Payment Received (RM)	61.25	49.45	48.00		59.15		133.20	117.75	468.80
Participation Rate (%)	14		24		28		38	34	(Ave.) 28

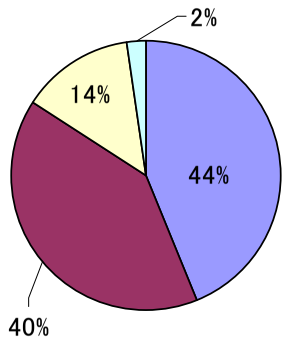
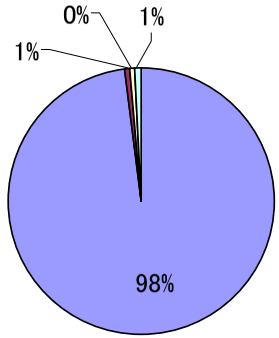
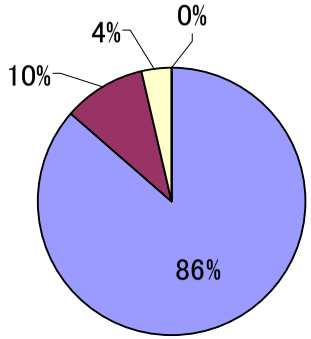
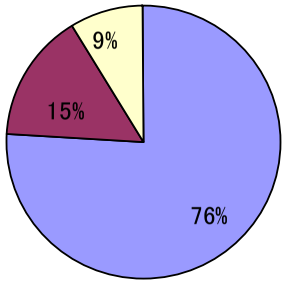
After the Pilot Project period, there have been additional requests from other apartment buildings. Two apartments (i.e., D'Tiara and Sri Penaga) who are under the same management as D'Palma have requested for similar programmes in their apartments. Another apartment block in Puchong (La Lite) has also requested a briefing on the mechanism and experience of this source separation project as they are also planning a recycling programme in their neighbourhood.

(5) Summary of Results of Source Separation for Households

Table 6.4.11 shows the participation ratio of source separation activities in each target group, composition of recyclables collected and average amount of recyclables collected. Participation ratios in average are rather high (24% in MPPP, 60% in Krokop 10 in MBM, 28% in MPSJ) except for Krokop 6 in MBM (5%). More than 75% of recyclables were papers (98% in Krokop 10 in MBM, 86% in Krokop 6 in MBM, 76% in MPSJ) except in MPPP (44%).

Duration of source separation practice of PP-II-2 was only 3 to 4 months. It is recommended that this activity should be continued with periodical monitoring, and long term records (i.e. one year or more) should be analysed.

Table 6.4.11 Summary of Results of Source Separation for Households

	MPPP	MBM		MPSJ
Type of house	Terrace house	Terrace house		Apartment
No. of HHs.	409 HHs incl. 12 shop houses	184 HHs (Krokop 10)	104 HHs (Krokop6)	288 units
Collection methods	Door-to-door	Door to door &Station Collection		Station Collection
Equipments	1 HDPE bin	1 plastic bag & boxes for papers		3 plastic bags & containers
Separation method	*2 separation	*3 separation		*4 separation
Collector	Private recycler	NGO	Collection Contractor	Private recycler
Frequency	1/ week (Sunday)	1/ 2 weeks (Sunday)	1/ week (Saturday)	1/ weed (Sunday)
Incentive	Non	Donation (Directly)	Donation(via contractor to NGO)	Proceeds are back to committee
Participation Ratio	24 % (average)	60 % (average)	5 % (average)	28 % (average)
Waste Composition				
	Paper, Metal& Glass, Plastics, Others			
Amount of Recyclables Collected	Average 487 kg/time	Average 1355kg/time	Average 68 kg/time	Average 456 kg/time

(6) Public Awareness Survey

Questionnaire surveys were conducted to capture the changes in 3Rs awareness of household through the Pilot Project (PP), and to evaluate this PP. Survey was carried out three times, i.e., before, during, and after the Pilot Project.

It was found that the majority of respondents already had some knowledge on 3Rs, and was practising it. However, comparing the results before, during and after the pilot project, there have been significant improvements in both knowledge and practices on 3Rs.

Table 6.4.12 shows the number of samples for awareness survey conducted in each LA.

Table 6.4.12 Number of Samples for Awareness Survey

Item	MPPP	MPSJ	MBM
No. of Sample	100 hhs	288 hhs	105 hh
Pre Source Separation	100 HHs responded	93 HHs responded (32.3 % response rate)	80 responded
Mid Source Separation	100 HHs responded	112 HHs responded (38.9 % response rate)	Not be implemented
Post Source Separation	100 HHs responses	105 HHs responded (36.4 % response rate)	76 responded

Figure 6.4.6 shows the change in knowledge on 3Rs among residents in the target area. From the graph, significant improvement in knowledge on 3Rs between pre, mid and after PP is observed. As for question No.1, "Do you know what items can be recycled", after the Pilot Projects, there were no respondents who answered "No idea", whilst 1% (average of 3 LAs) had answered "no idea" before the PP. This increase in awareness can be considered to be the outcome of the 3Rs promotional activities such as distribution of pamphlets, 3Rs brochure, and workshop undertaken during pilot projects.

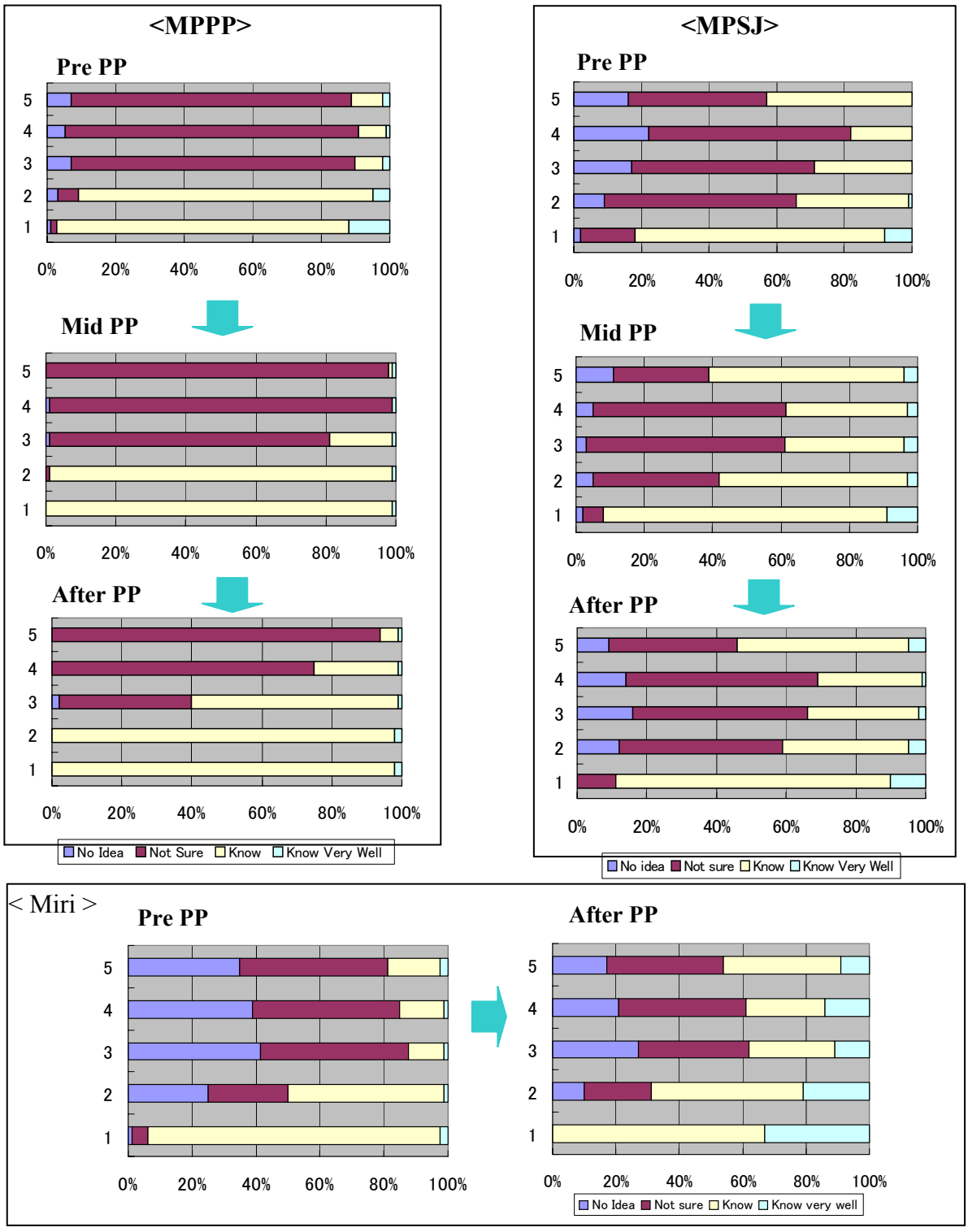
However, there still remain a considerable number of people who are "not sure" about ideas for reduction, recycling and reuse of wastes. It is suggested that awareness campaigns be carried out continuously after PP.

In addition to the improvement in knowledge, there can be seen improvement in practice of 3Rs activities in the daily life (see Figure 6.4.7). In MBM, number of people who answered "Yes" to the practice of REDUCE activities (question 1, 2, 3, 4) showed a significant increase. It can be considered that through the source separation practice which requires them to think how to separate every time they dispose, people started to take into consideration of disposal before they buy things. Especially as for "buy wisely" question, 87% of the respondents in MBM answered "yes" after PP, while only 37 % of them had been practicing "buy wisely" before the PP. From these results, it can be concluded that introduction of source separation contributed to improve consumption habit.

Notwithstanding these encouraging results, some negative impact was observed in the survey results. In the 2 model LAs (MPPP and MPSJ), number of respondents who refuse plastic bags at shops dropped by 14% and 4 % respectively. According to the

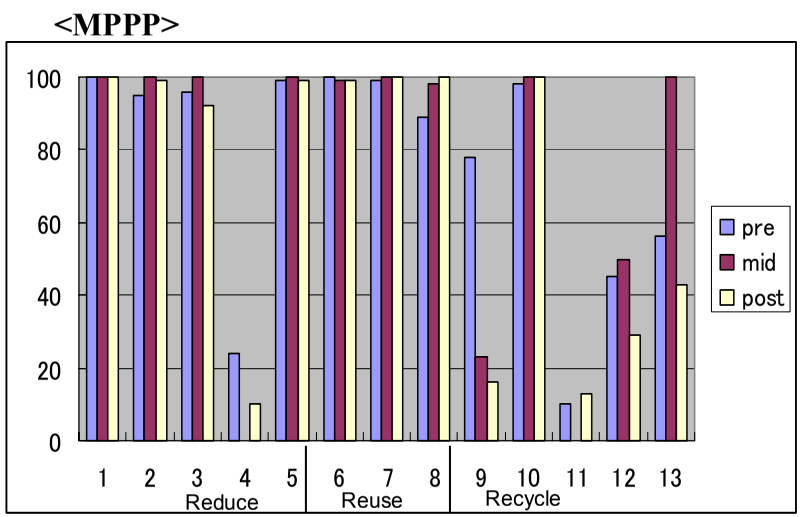
comments, main reasons for not refusing bags are that they are not sure what alternatives are available, and they want to use those plastic bags to put wastes/recyclables during waste separation. In MPPP, where plastic bags were not distributed for this project, the largest decrease ratio was seen. To encourage "refuse plastic bags" activities, it may be needed to give information for alternative equipments for source separation.

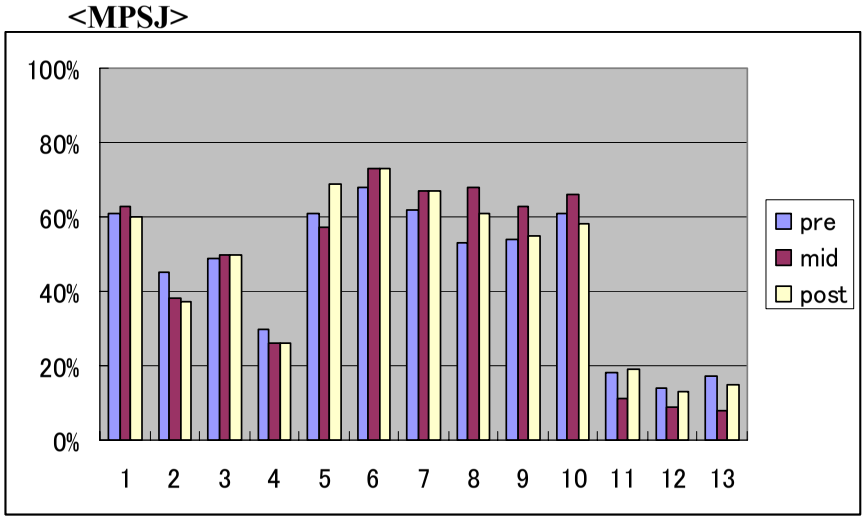
There are interesting results in MPPP, the number of respondents to "sending / selling recyclable items to recycling centres" dropped after implementation of the Pilot Project. This result could be owing to the convenience of the separation of waste at source programme and door to door collection on every Sunday by the appointed recycling agent.

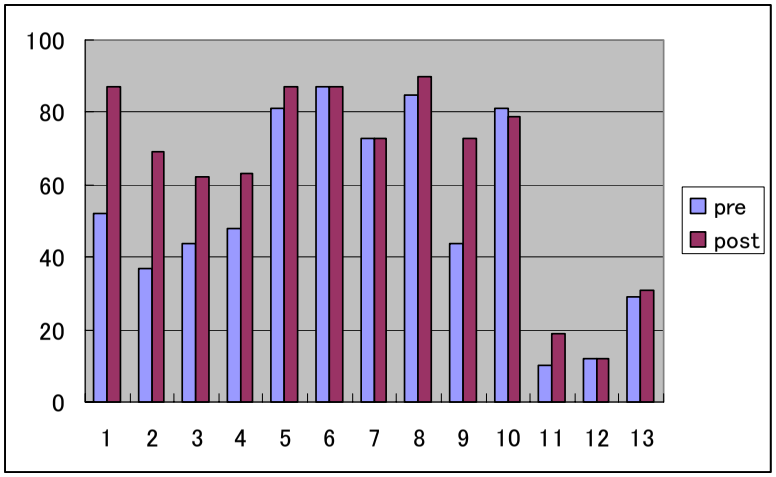


<Questions>
1. What items can be recycled, 2.Who collect recyclables
3. Where are recyclables sent 4. How the recyclables are treated
5. Ideas for reducing/ reusing/ recycling wastes

Figure 6.4.6 Change in knowledge on 3Rs matters (pre, mid and post survey in the 3 LAs)







<Questions>

1. Buy wisely, 2. Avoid buying/using disposable goods
3. Refuse excessive packaging at shop
4. Refuse plastic bags at shop
5. Use washable, refillable beverage container when you go out
6. Wash and reuse bottles, cans & bins
7. Reuse half-used paper
8. Practice waste separation at home/office for recycling
9. Send/sell recyclable items to recycling centres
10. Sell/give recyclable items to collectors
11. Buy from second hand/recycling shops
12. Volunteer at recycling organisation
13. Compost yard and garden wastes etc

Figure 6.4.7 Change in Current Practice of 3Rs Activities

There also can be seen remarkable improvement in practice of source separation. Figure 6.4.8 shows the comparison between the results of survey on current practice of source separation before, during, and after the Pilot Project in MP Subang Jaya. Eighty-nine (89%) of respondents were separating old newspaper since before the Pilot Project, which increased to 100% of respondents after the Pilot Projects. As for cardboard, plastic bottles, glass, and metal/aluminium cans, the percentage increased up to 90%. This also can be considered to be the outcome of the series of awareness campaign.

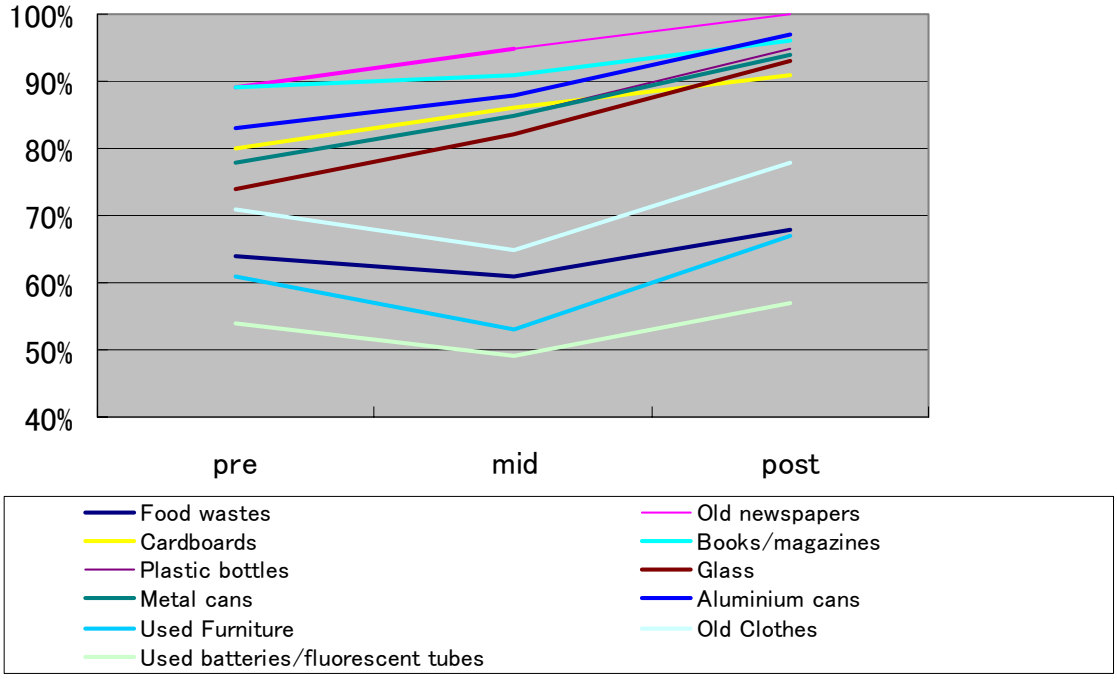


Figure 6.4.8 Percentage of Households Undertaking Source Separation (Pre, Mid and Post Surveys in MPSJ)

(7) Preparation of Guidelines for Source Separation

Based on the experience of PP-II-2, "Guidelines for Source Separation of MSW" has been formulated. Flow chart introduced in the Guidelines is as shown in Figure 6.4.9.

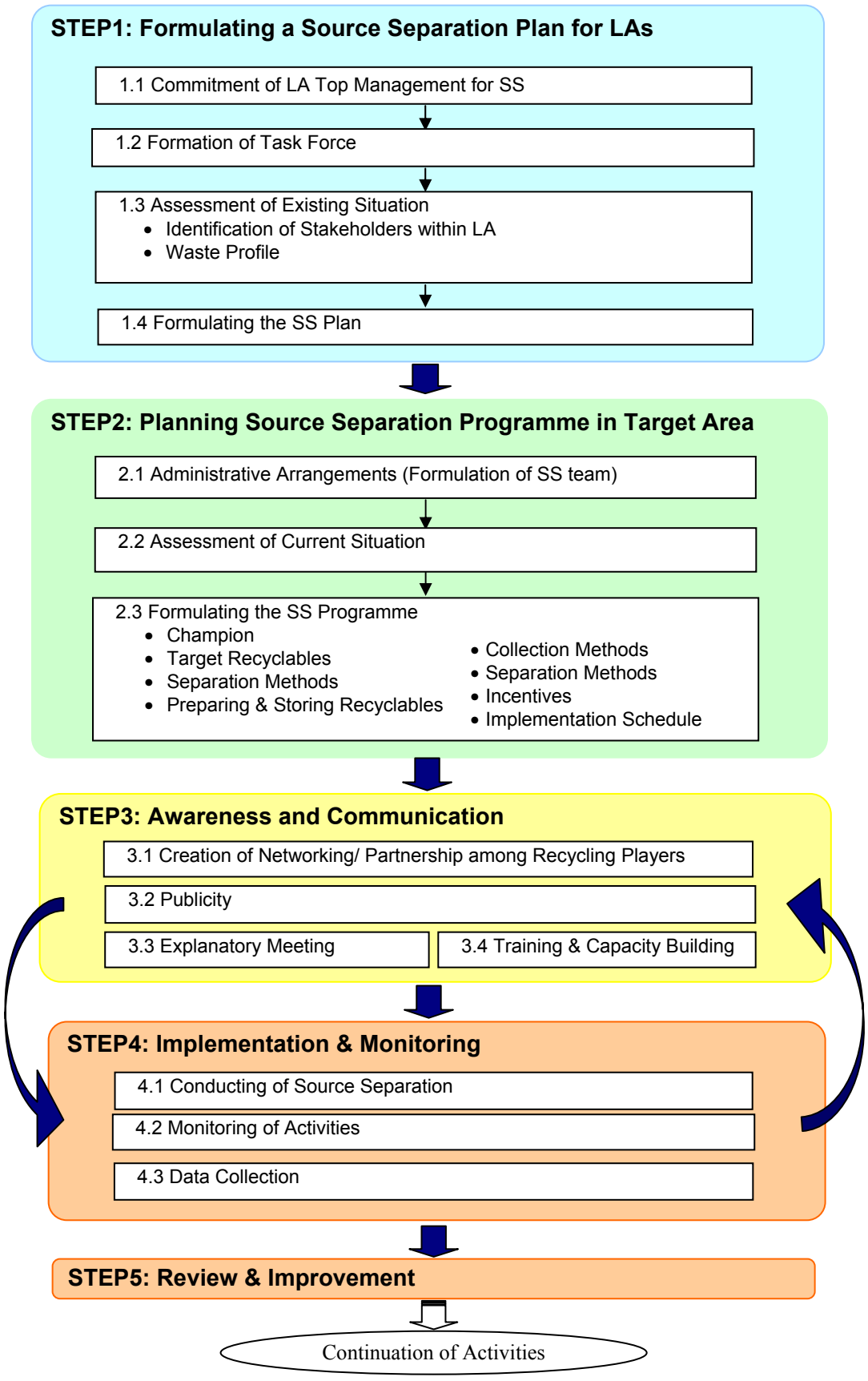


Figure 6.4.9 Flow Chart for the "Guidelines for Source Separation of MSW"

6.4.3 Source Separation for Institutions (MPSJ Complex, MPSJ)

(1) Description of MPSJ Complex and Current Recycling Programme

MPSJ complex comprised of nine departments (comprising 36 sub-units) and 3 units. There are 1,200 employees working in the MPSJ complex.

Since 2004, the management of MPSJ has organised an on-going source separation programme at its headquarters as well as at its two branches. The collection centre is located in MPSJ complex and is based on a buy-back system. Individual staff brings recyclable materials from their work place or from home to the collection centre and get paid on the spot.

Table 6.4.13 Amount and Value of Recyclable Materials Collected by MPSJ Staff (January to June 2005)

No.	Category	Total (kg)	Value (RM)
1.	Paper	6,989	853.98
2.	Cartons	882	88.22
3.	Glass	314	15.70
4.	Plastics	295	29.45
5.	Aluminium & Metal Cans	139	41.85
	Overall	8,619	1,029.20

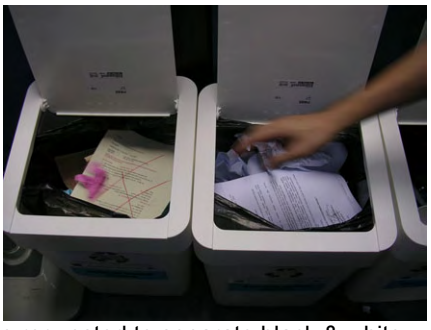
(2) Source Separation Practice in MPSJ Complex

Source separation system introduced at MPSJ complex is as described in Table below.

Table 6.4.14 Source Separation System at MPSJ Complex

Item	Contents
Method tested	Station collection for papers
Target Items	Paper (reduction of papers)
Duration	8 weeks
Collection Frequency	• Once a week for recyclable items by an appointed recycling agent.
Equipments for source separation	• 3 bins for recyclables (newly introduced to all departments) (1 for white paper, 1for mixed paper, 1 for other recyclables) • Existing bins for non-recyclables
Segregation method	4 Separation : White paper, mixed paper and other recyclable materials, non-recyclables (organic wastes, etc) MPSJ staff disposes all recyclable materials into relevant bins. Recyclables are then sent to the current MPSJ buy-back centre and the money and points received are then credited to the department.
Collector	Private Collector
Collection Fee	No additional fee for collection
Incentives	3Rs Competition (see below)

A set of 3 collection bins were distributed to each department.



Staffs were requested to separate black & white paper from other papers.

Recyclables collected were weighed for competition

Plate 6.4.6 Source Separation Practice at MPSJ Complex

(3) Explanatory Meeting for Staffs

An explanatory meeting with the respective departmental heads of MPSJ for the paper-recycling project was conducted on 8th September 2005 at MPSJ Seminar Room.

During the meeting, the paper-recycling project within the MPSJ complex was briefed followed by the discussions on topics below. At the end of the explanatory meeting all departmental heads agreed that they would assign one officer per unit to manage and monitor the paper-recycling project for their respective units. The attendants also provided suggestions and recommendations for the project as follows.

<Topics>

- Identification of location for bins.
- Specific suggestions to reduce paper use within departments
- Criteria that will be taken into account for rewarding departments paper recycling project
- Current practice whereby staff, on their own initiative, sell to collectors
- Most of the staff practices recycling just to gain something (money value in every action).

<Suggestions and Recommendations from Participants>

- All confidential documents need to be shredded (using the shredding machine) before being thrown into the bins.
- Create a quota system and limit the paper supply in every department.

- Create awareness among staff. This could be done through support from the project initiator in the form of pamphlets, posters, banners, etc.
- All Heads of Departments should play their roles to ensure the success of this programme. There must be specific guidelines for them to follow.
- Need to change the attitude and mind of all and to be more disciplined. Organising of competition is necessary if all have that attitude.

(4) Public Awareness Activities

Public awareness activities that have been undertaken during the pilot project period are as follows:

- Meetings and discussions as well as distribution of source separation pamphlets to institutions (MPSJ complex)
- Newspaper articles (New Straits Times and The Star (English) and Oriental Daily (Mandarin)) on the pilot project objectives and activities.

(5) Results of Source Separation Activities

The amount of recyclable materials collected by MPSJ staff for their earlier competition between January to June 2005 was 8,618 kg. Of this, 82% (6,989 kg) was paper. Table 6.4.15 shows the total collection of recyclable materials within the MPSJ complex by MPSJ staff.

Comparing the amount of paper bought and paper collected, amount of recycled paper was higher than the amount of paper bought in some departments. This could be due to the fact that staff brought recyclable paper from home, or recyclable paper had been stocked for several months and then brought in for recycling.

Table 6.4.15 Amount of Recyclable Collected in MPSJ Complex

Week	Date	White paper (kg)	Mixed paper (kg)	Other recyclables (kg)
1	29 Sept 05	56.2	72.0	9.8
2	6 Oct 05	35.5	37.2	4.5
3	13 Oct 05	48.7	34.9	4.4
4	20 Oct 05	1.0	8.0	0
5	27 Oct 05	28.8	33.7	4.0
6	3 Nov 05	Hari Raya Puasa		
7	10 Nov 05	4.0	11.0	2.0
8	17 Nov 05	-	769.0	-
	Total (kg)	210.3	960.8	24.7

<3Rs Competition>

Reduction ratio, Reuse ratio and Recycling ratio were calculated based on the results of activities in each department, and evaluated to decide the Department that reduced the most, Department that reused the most and Department that recycled the most. Improvement ratio was also examined for additional award. Winners for each award were decided as shown in Table 6.4.16.

Table 6.4.16 Results of 3Rs Competition

Award	Name of Department
Reduce	Dept of Health and Town Service
Reuse	Dept of Landscape
Recycle	-
Recycling improvement rate	Dept of Assessment & Property Management

6.4.4 Source Separation at Mega-Mart (South City Plaza, MPSJ)

(1) Description of South City Plaza and Current Recycling Programme

Opened since November 2003, South City Plaza (SCP) in Seri Kembangan is a shopping complex located in the southern corridor of the Klang Valley, in the urban area of Seri Kembangan and Serdang, about 20 Km south of Kuala Lumpur.

This shopping complex contains 143 shops and restaurants with Giant and Parkson being the two main anchor tenants. SCP has 4 floors, the first two being filled with shops, restaurants and offices. The third floor is used for amusement and recreation activities. The management office of SCP is located on the fourth floor.

There was no source separation actively undertaken by the tenants except for Giant Super Store and Parkson. These two outlets have their own disposal and collection centres. The other tenants throw rubbish (both recyclable waste and organic waste) in the common garbage bins located throughout the building.

The housekeeping staff currently collects these garbage and brings them to the central garbage collection point. The staff normally scavenges for recyclable materials before dumping the garbage at the collection point. The recyclable items collected are stored in their store room and sold to collectors separately. The SCP management does not interfere in this matter since these are done after the housekeeping staffs have completed their duties.

Figure 6.4.10 shows the current status of wastes generation in the South City Plaza.

Table 6.4.17 South City Plaza – Profile

Type of Store	Floor-space / sq.ft	Number of Shops
Anchor Tenants	137,698	3
Bakery, Food-court and Restaurants/Cafes	32,936	13
Computer, Electrical Appliance, Telecommunication	35,330	12
Entertainment, Leisure	29,858	4
Fashion, Fashion Accessories, Lingerie Shop	58,534	39
Beauty Salons, Massage	6,312	7
Footwear, Luggage & Bag Accessories	8,822	12
College, School, Banking Service and Other Offices	15,178	9
Car showroom & Accessories	3,761	1
Music, Movie, Game, Bookstore, Musical instruments	35,543	10
Health Products, Personal Care, Optical	8,578	13
Gift, Toys, Hobbies, Souvenir	4,036	4
Goldsmiths & Jewellery, Clock & Watches	6,256	10
Home Improvement	33,723	6
Total	416,565	143

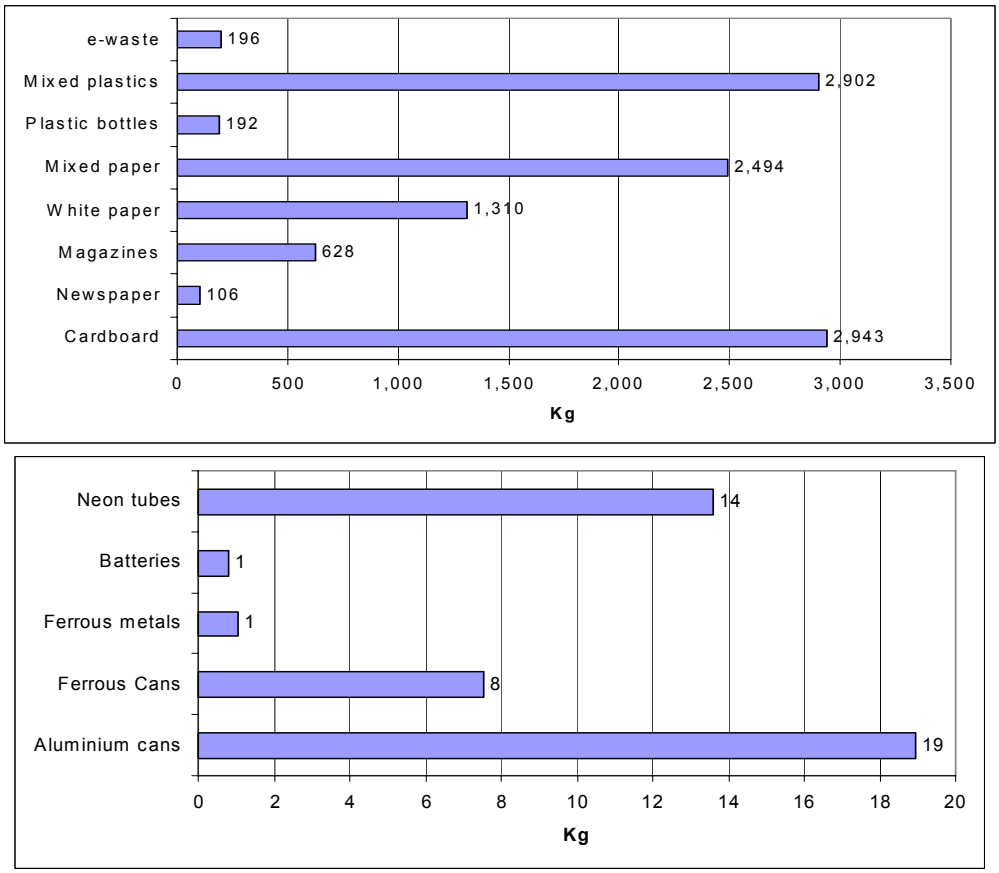


Figure 6.4.10 Amount of Waste Generated Monthly

(2) Source Separation Practice in South City Plaza

The source separation project that was finally identified for South City Plaza was a buy-back cabin. The study team together with MPSJ decided to appoint Alam Flora to manage the buy-back centre.

After numerous meetings and discussions between the Study team, MPSJ and Alam Flora, it was agreed that the buy-back centre at South City Plaza is operated with organisation structure as illustrated in Figure 6.4.11. Since this projects the co-operation from two private companies that take business as the first priority, it took three months to reach conclusion, which satisfies the requirements of all the players'. This time consuming discussions indicated that the commitment of top management is crucial to introduce a successful recycling programme.

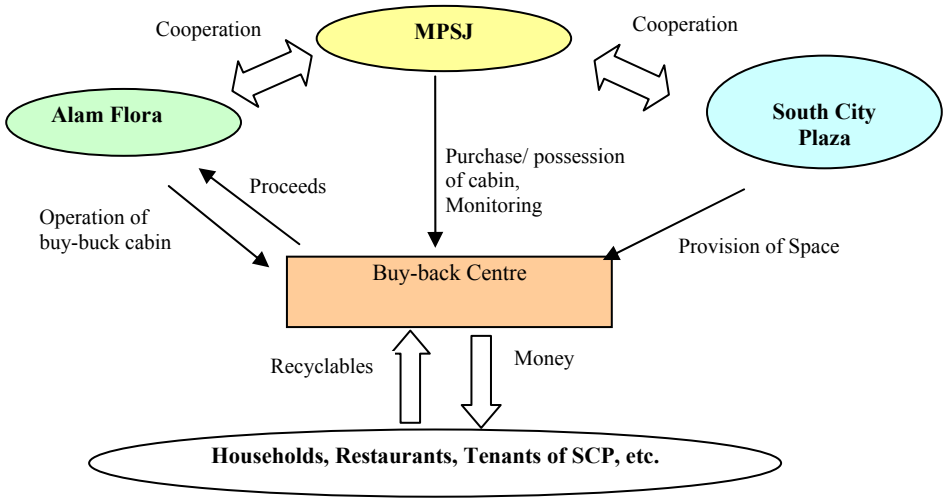


Figure 6.4.11 Basic Operation Structure for South City Plaza Buy-back Centre

Plate 6.4.7 Buy Back Centre in South City Plaza

(3) 3Rs Awareness Campaign

A soft launch of the cabin was undertaken on 7th November. Posters and pamphlets were put up and distributed during the soft launch of the buy-back cabin. An official launch plus an awareness campaign was undertaken on 25 November 2005 whereby 3Rs brochures and shopping bags were distributed to public and attendants to the launch. In the first week of operation, prior to the official launch, the response to the buy-back cabin was very low.

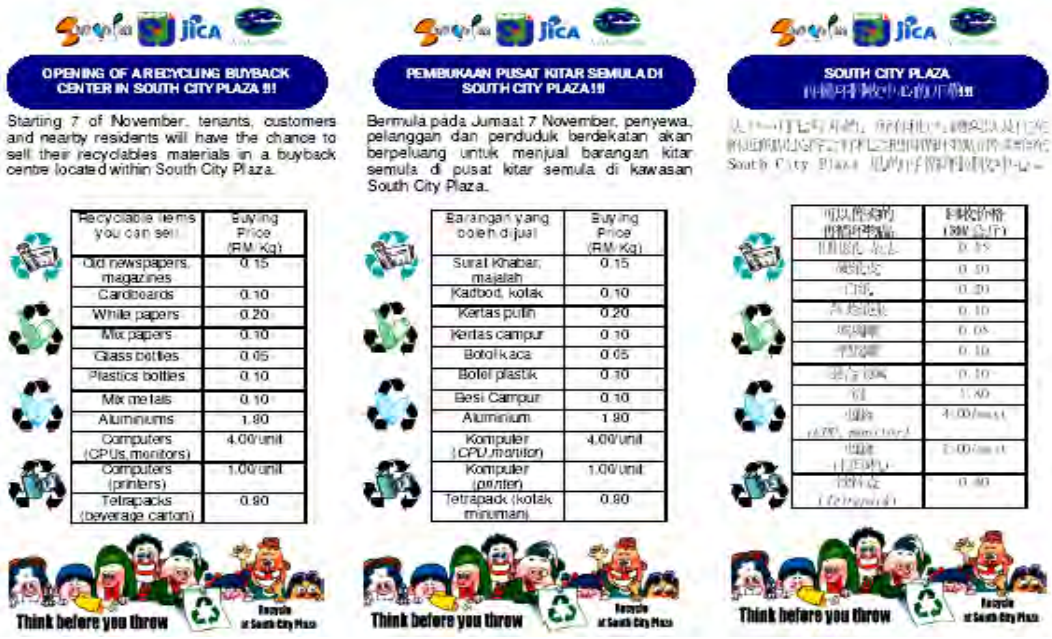


Plate 6.4.8 Leaflet (below) for Buy-back Centre at South City Plaza

6.4.5 Source Separation at Hotels (Dynasty Hotel in MBM)

(1) Description of Dynasty Hotel and Current Recycling Programme

Dynasty hotel has a total of 132 rooms and a yearly average occupancy rate of around 80%. Dynasty hotel has around 160 staffs where 30 of them are from the housekeeping section. Dynasty Hotel indicated their enthusiasm to get involved in this project at the beginning.

The recycling activities in the hotel are very informal and mainly related to newspaper, corrugated cardboard and aluminum cans. The recycling was implemented informally by the housekeepers of the hotel. There were no recycling programmes in the hotel office or targeted towards the hotel guests.

Plate 6.4.9 Dynasty Hotel in Miri

(2) Source Separation Practice in Dynasty Hotel

1) Source Separation System introduced in Dynasty Hotel

For Dynasty Hotel, the collection system in guest room and series of reduce and reuse activities were proposed in the initial stage. However, due to many concerns and considerations of the impact on the normal business activities, such as the risk of guest putting on fire, the time constraints for cleaners to empty the source separation bins,

etc., it was decided that introduction of source separation system into limited area, i.e., guest rooms on 2 floors, administration office and outside the hotel. Collection system implemented is as summarised in Table 6.4.18. Figure 6.4.12 shows collection route during the Pilot Project.

Table 6.4.18 Source Separation System at Dynasty Hotel

Item	Contents
Target Area	Guest rooms on selected floors (3rd and 4th floor), Administration office and function rooms Restaurants, collection centre established behind the hotel
Target Items	Papers, Plastic, Metals, PET bottles
Equipments	Transit collection bins with plastic bags at staff lift area on 3rd and 4th floor Collection containers at collection centre Recycling collection boxes and plastic bags at the administration office
Segregation Method	Hotel guests were requested to separate recyclables from other wastes, and to bring those to the transit collection bins set up near the emergency exit on 3rd and 4th floor. The recyclables were weighed and recorded by the housekeepers before the transfer to the recycling station.
Collector	Recycling agents i.e. Syabas Synergy and 3Rs Enterprise

Collection Containers Situated at Backyard of the Hotel

Information leaflet inside the guest room

Recycling Bins at lift area on 3rd and 4th Floor

Plate 6.4.10 Source Separation Activities in Dynasty Hotel

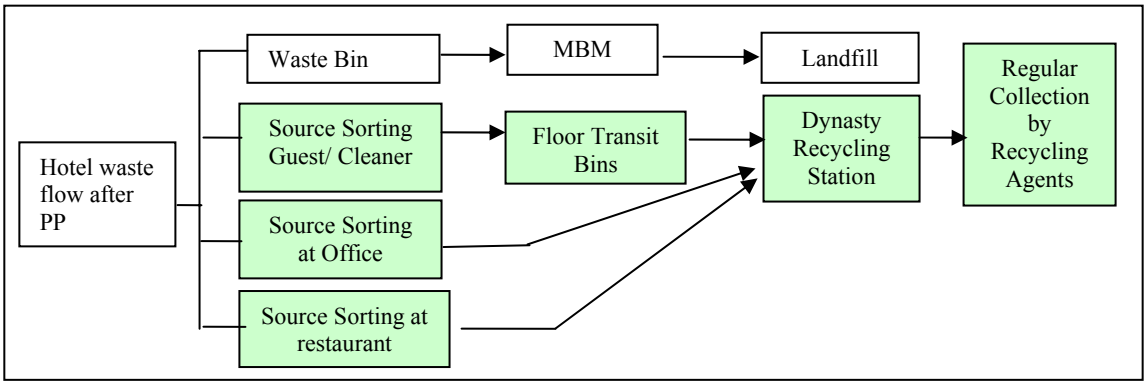


Figure 6.4.12 Waste Flow During the Pilot Project

2) Explanatory Meeting for Dynasty Hotel Staff

An explanatory meeting for Dynasty Hotel staff was carried out on 24 August 2005. The participants included most of the section representatives of the hotel as well as representative of the housekeeping section that is very important for 3Rs initiatives. During the meeting, 3Rs awareness talks was given by Miri City Council (MBM) and Natural Resources and Environmental Board (NREB), followed by briefing on the source separation in Dynasty. Information brochure on 3Rs for hotel, recycling boxes and bags were distributed at the meeting.

3) 3Rs Awareness Campaign

Information leaflets prepared for the hotel guests were placed inside the guest rooms as well as distributed to the guest when they checked in. Banner designed was set up in front of Dynasty Hotel to let the public know about this project.

4) Results of Source Separation

Amount of recyclables collected during the pilot project periods at Dynasty Hotel is as shown in Table 6.4.19.

Table 6.4.19 Total Recyclables collected at Dynasty Hotel on November 2005

Type of recyclables	15.11.05	28.11.05
Newspaper	127	8
Others paper	20	0
Old Corrugated Cardboard	0	30
PET mineral water bottles	6	28
Others plastic containers	2.5	0
Total	155.5	66

Due to the time consuming preparations, the collection system started only in late October 2005. It was too early to conclude any trend in relations to the performance and amount of recyclables collected at Dynasty Hotel at the time of reporting.

There were however some issues of concerns:

- For the recycling bins at the staff lift area, the feedbacks from hotel guests were not encouraging mainly due to the location and visibility of the recycling bins. The location of bins was not convenient for guests and there were no signs allowed by management on the door leading to the recycling station area;
- There were some mixed waste and un-cleaned recyclables sent to the recycling stations behind the hotel. Clear signboards and instruction on source separation were set up. Further training of hotel staff on source separation need to be carried out.

It was observed that the amount of recyclables collected at the stations include those sent by some public. This also indicates that the effort is not only restricted to influencing the hotel but also public who frequent visits the hotel compound. Most of the recyclables collected were paper products.

PCM Roundtable

OJT for MPPP Officers

Briefing on Source Separation for Residents

Launching Ceremony

3Rs Workshop (03 September 2005)

Distribution of Bins

3Rs Campaign (3Rs Camp for Students)

Plate 6.4.11 PP-II Activities in MPPP

PCM Roundtable

OJT for Officers in MBM

Questionnaire Survey

Launching Ceremony

Explanation Meeting at Dynasty Hotel

Source Sorting Activities at Krokop

3Rs Campaign with Incentives

Plate 6.4.12 PP-II Activities in MBM

PCM Roundtable

Stakeholders' Workshop

Explanatory Meeting on Source Separation At De Palma Condominium

Registration to the Project

Explanatory Meeting at MPSJ Complex

Launching Ceremony at South City Plaza

3Rs Campaign at South City Plaza

Plate 6.4.13 PP-II Activities in MPSJ

6.5 Evaluation of PP-II

6.5.1 Achievement Level

Based on the objectively verifiable indicators (OVIs) of the PDMs, the achievement level of Project Purpose and Outputs of PP-I were evaluated as shown in Table below. Overall, it can be considered that most of the outputs achieved were within expectation, and project purpose was partially achieved

Table 6.5.1 PP-II-1: Establishment of Local Recycling Network

Project Purposes/ Outputs	OVIs	Achievement Level
Project Purpose • Sustainable recycling is carried out under the leadership of LAs. • Capacity of LAs to monitor recycling activity is improved.	1. Frequency of reporting 3Rs practices to MHLG 2. No. of players to be monitored	The Project Purpose was partially achieved. The number of recycling players contacted by the LAs increased during the waste flow survey conducted as described in previous section. This information would facilitate monitoring networking in future to collect data and information on stakeholders' activities. Therefore, it can be said that the capacity of LAs to monitor recycling activity is improved. Having increased the network of stakeholders, the onus now is on the LAs to register the stakeholders and continuously maintain and sustain contact with them. Certainly, this would require commitment from the LAs and its management team, and allocation of manpower and annual budget to undertake monitoring and coordination of stakeholders.
Output 1: Data management system on SWM & 3Rs at the local level is established.	Waste generation amount, 3Rs quantity data and 3Rs activity practices.	Data management system at the local level was established. In MPSJ, for instance, information on recycling was based solely on data collected from Alam Flora; certainly, the recycling data and scenario captured did not present the actual situation in MPSJ. However, MPSJ encountered and established networking with more stakeholders through the waste flow survey conducted for PP-II, and consequently, MPSJ is now able to obtain more accurate data on the state of recycling within its jurisdiction. This improvement was observed in other model LAs. Having established a more systematic data management system, the system must be updated periodically by a team of designated staff. This requires commitment from the LAs and its management team, and allocation of manpower and annual budget to undertake

		periodic monitoring and updating of the data management system.
Output 2: Waste Minimisation Unit (WMU) is established in LAs (tentative-base)	No. of WMU staffs.	The WMU was established in all model LAs during the PP, and at least 1 to 3 Council officers were assigned to the WMU during the PP period. Having established the WMU, the unit must be manned by designated staff. Again, this requires commitment from the LAs and its management team, and allocation of manpower and annual budget to run the WMU.
Output 3: Recycling is carried out by stakeholders participated in PP.	Type & amount of recyclables handled by each stakeholder participated in PP.	Types and amount of recyclables handled by each stakeholder in target areas increased after the PP. The LA must maintain the initiatives and momentum established by the PP and periodically monitor and encourage (through education programmes and incentives) participation of the stakeholders. This requires commitment from the management team of the LA, including allocation of manpower and annual budget to run the WMU and 3Rs programme.
Output 4: 3Rs related information is published.	No. of 3Rs related information brochures, directory booklets etc. published.	3Rs related information brochures and directory booklets were successfully published and distributed to the public. In addition to the brochures, website on 3Rs was also established by each LA to disseminate more information to the public.
Output 5: Capacity of LAs officials and regional 3Rs leaders are developed.	Number of LAs officials/ regional leader participated in on-the-job training. (see activities)	At least 3 officers in charge of the project in the model LAs participated in OJT, and some of them were involved in this project from the planning part. Those officers have gained in terms of knowledge and skills. Moreover, the officers are now more aware of the importance and significance of waste minimisation through the numerous workshops held in conjunction with the PP.

Table 6.5.2 PP-II-2: Source Separation of MSW

<table>
<tr><th>Project Purposes/ Outputs</th><th>OVIs</th><th>Achievement Level</th></tr>
<tr><td>Project Purpose
Collection amount of recyclable materials separated at source increases.</td><td>Collection amount of separated waste at source</td><td>The Project Purpose was only partially achieved. Though a source separation system was set up for the target households, the rate of participation was rather low and the volume of collection was variable and inconsistent for a variety of reasons.

The source separation programme at the target mega-mart and hotel encountered several issues in coordination and consensus among the stakeholders, in particular the private business sector and private collector. This resulted in significant delay in implementation.</td></tr>
<tr><td>Output 1:
Source separation is carried out by residents/ communities and business entities.</td><td>1. No. of stakeholders participating in PP

2. Frequency of source separation for each waste type.</td><td>The source separation system was established in cooperation with the stakeholders in the target area as follows;
<table>
<tr><th>LAs</th><th>Target</th><th>Recycling agents</th><th>Collection Frequency</th></tr>
<tr><td>MPPP</td><td>409 households</td><td>Recycling agents</td><td>1/week</td></tr>
<tr><td>MPSJ</td><td>288 households in De Palma Condo</td><td>Private recycler</td><td>1/week</td></tr>
<tr><td></td><td>MPSJ complex</td><td>Appointed recyclers</td><td>1/week</td></tr>
<tr><td></td><td>South City Plaza,</td><td>Alam Flora,</td><td>Everyday</td></tr>
<tr><td>MBM</td><td>288 households</td><td>Buddhist Tzu Chi, Garbage contractor</td><td>1/ 2weeks
1/week</td></tr>
<tr><td></td><td>Dynasty hotel (166 staffs)</td><td></td><td>Everyday</td></tr>
</table></td></tr>
<tr><td>Output 2:
Recycling route of recyclables (paper, glass, can and PET) is established.</td><td>Amount of source separated, discharged, collected and sold.</td><td>A new recycling route was established at each target housing area in the model LAs. The collecting route was improved so that recyclables could be collected on a regular basis by appropriate agencies. Though the amount of recyclables collected increased during the PP, the increase was only marginal.</td></tr>
</table>

<table>
<tr><th>Project Purposes/ Outputs</th><th>OVIs</th><th>Achievement Level</th></tr>
<tr><td>Output 3:

Profit from selling recyclables return to communities/ institutions.</td><td>Amount of profit from selling recyclables and income of communities from it.</td><td>Selling route of collected recyclables was established.
<table>
<tr><th></th><th>Target Area</th><th>Groups that can obtain profit</th></tr>
<tr><td>MPPP</td><td>Hillside area</td><td>Collector (No profit is return to the residents.)</td></tr>
<tr><td rowspan="4">MPSJ</td><td>De Palma Condominium</td><td>Condominium management committee</td></tr>
<tr><td>MPSJ</td><td>Each department participating</td></tr>
<tr><td rowspan="2">South City Plaza</td><td>Anyone who bring recyclables to the centre</td></tr>
<tr><td>Residents who brings to the buy-back station</td></tr>
<tr><td>MBM</td><td>Krokop area</td><td>NGOs, Buddhist Tzu Chi (Recyclables collected in door-to-door collection are donated to NGOs)</td></tr>
</table></td></tr>
<tr><td>Output 4:
Awareness of communities/ residents for waste Minimisation/ recycling is enhanced.</td><td>Number of residents participating in PR activities</td><td>Public awareness raising activities were carried out throughout the project period. Most of activities were implemented at strategic locations determined by the implementing committee in each LA or as a joint activity with other events. 3Rs information brochures were distributed to the participants at these activities. It is considered that those promotion activities contributed the enhancement of awareness among stakeholders.</td></tr>
</table>

6.5.2 Evaluation by OVIs

Table 6.5.3 Evaluation of PP-II

Criteria	Evaluation
Relevance	The Project Purpose and Overall Goal for PP-II-1 and PP-II-2 are relevant to the needs of the counterparts. It also is compatible to the policies and target of the Malaysian government to minimise and manage solid waste.
Effectiveness	Partial results were achieved as described in the previous section.
Efficiency	**(1) Inputs for the project** During this project, items listed in PDM were put in place to promote the activities. < Personnel > From JICA, Japanese and local experts were at hand to organise, coordinate, advise and guide the LAs. The local consultants were stationed in the LA office to work with LA officers in charge of the pilot project, ensure that the activities were implemented smoothly and effectively, and to serve as liaison between the local counterparts and the Japanese experts. <Equipment> Equipment (computer hardware and software) were provided to each LA based on the review of present situation and the demand of target groups. In addition to personnel and equipments, explanatory meetings, 3Rs campaign, dialogue sessions and house-to-house canvassing during the pilot project period were undertaken to enhance the participation as well as increase the awareness of residents in 3Rs activities.

	(2) Organisation management Generally, the local consultants stationed at the WMU established within the LA worked in close rapport with the officers in charge. Occasionally, problems arise, such as delayed implementation of the project, due to inadequate commitment of the top management and time constraint of the local LA officers who had to attend to other administrative matters, or who were not assigned fulltime to the WMU. Without full commitment and pro-active role from the top management, full efficiency in implementing these activities was not achieved.
Impact	Impact includes positive and negative, and expected and unexpected impacts on counterparts and target groups made by the pilot project. The data obtained during the pilot project indicates the positive impact on the relevant parties, such as increase in amount of recyclable collected were increased, awareness among public, and income from the selling of recyclable collected. This project also made negative impacts on certain stakeholders, however, judging from the feedbacks from the counterparts and target groups, it can be concluded, overall, that this project gave highly positive impact on stakeholders including counterparts. **a. Positive Impacts:** Positive impacts made by PP-II are as follows; a. Awareness of public increased. b. Amount of waste that goes directly to the landfill is in the decrease trend c. Income from the collected source separated waste channelled back to the generators/ Organisation. d. More structured system to track 3Rs results in LA **(2) Negative Impacts:** a. Loss of income from the scavenging activities by the informal/individual collectors. b. More frequent stealing of recyclables by non-appointed agents a. Loss of income from the scavenging activities by the informal/individual collectors. Before the pilot projects, some people such as housekeepers at apartment and hotel were getting proceeds from selling recyclables as their income. But official recycling system formulated at the target area during this project squeezed out those informal/individual recycling activities, and prevents informal recycling agents from earning money from scavenging activities. This loss of income for them can be considered to be negative impacts. b. Frequent stealing of recyclables by non-appointed agents As residents started separating recyclables from organic wastes, it became easier for itinerant recyclers to pick up those recyclables from the collection bins. This stealing give adverb effects on sustainability of source separation project as it discourages generators as well as appointed collectors. However, on the contrary, it can be said that the value of recyclable items has been higher by segregation at source. It is expected that source separation activities stimulate recycling business.
Sustainability	**(1) Sustainability of WMU** a. Organisational and Financial Sustainability MPSJ and MBM authorised WMU as a permanent function in their Council, and have already assigned the officers in charge. Therefore, it is hoped that

this unit will be sustained in long-term after the pilot project.

However, there will still be some financial issues. A lot of work will be required for WMU to continue source separation to further promote recycling activities, such as providing support in awareness campaigns and liaising between the residents committee and private recyclers so that any issues that may crop up can be settled amicably. It is uncertain that LA can allocate enough budgets for those activities. Some LA may need to have support from Federal Government to promote activities.

MPPP have difficulty in manpower to maintain WMU or this data collection system. Considering the volume of work required, it is needed to find someone to assign this task in full-time.

a. Technical Sustainability

The officers trained under the PP have benefited much in terms of experience during the last 6 months, especially those who were involved in the design, planning, implementation, surveys and feedback sessions with the stakeholders have also gained in terms of knowledge and skills. They are capable of carrying out the project activities independently after the expiry of the pilot projects. Therefore, it will be no technical problem to maintain WMU and its data management system after the pilot project period.

(2) Sustainability of Source Separation

a. Organisational and Financial Sustainability

In the source separation system formulated for the pilot project, all the three LAs does not need to pay additional fee for collection service by appointed recyclers. All those appointed agents are satisfied with the amount collected during the pilot project, and they have already expressed interest to continue collecting services in the project area after the pilot project. Therefore, it might not be financial / Organisational issues to continue on-going source separation system.

However, continuous cooperation from recycling agents totally depends on the amount of recyclables separated at source. Thus, the sustainability of the project now relies on the commitment and management of the residents committee. The committee has to have continuous programmes and events to highlight to the communities residing there on the source separation activity. Income derived from the sale of recyclable waste can be utilised by the committee to achieve this.

To sustain the impact of response after the pilot projects, other alternative mechanism, such as provision of equipments may need to be reconsidered. During the pilot project, target groups such as households were provided with bags/ boxed to separate their waste as a part of input from Japan side. LA must well consider and decide to what extent they can support the source separation in terms of finance. LA may need to have meeting with the residents committee/ representative of Organisation and work together to convince the people to continue their participation.

In MPSJ, three new apartment/apartment blocks have already indicated interest in similar projects after learning about this pilot project through newspapers. The same management company as the D'Palma Condo's owned these apartments. MPSJ has to meet and discuss with them on similar mechanism to implement the project in these new areas. It is hoped that source separation activities in MPSJ will be expanded via the management company.

6.5.3 Lessons Learnt and Recommendations

Issues encountered and recommendations of counter measures to be undertaken are summarised in Table 6.5.4 and Table 6.5.5.

Table 6.5.4 Issues Encountered and Recommended Counter Measures (PP-II-1)

Issues Encountered	Counter Measures/Recommendations
1) Data Collection	
• Uncertain trans-boundary movement of recycling items affects the waste flow balance in LAs (MPSJ, MBM)	• Trans-boundary movement data should be available from the surrounding areas in order to appreciate the real recycling scenario and to form a regional network between the city/towns. This requires further study, coordination from MHLG and full commitment and cooperation of the LAs and their management team.
• During the questionnaire survey, some of the recycling agents were not cooperative because of the questionnaire used contained too detail information and some information were regarded as confidential to the stakeholders;	• Questionnaires/data sheets should be simplified to the minimal required data if possible. It should be provided before the actual interviews are carried out.
• Except for recyclers operating the recycling centres, there is no current list available for other collectors or factories accepting recyclable materials in LA.	• List of recyclers and collectors must be updated periodically with assistance from the Organisation of recyclers, resident associations and recycling buy-back centre operators. • A full-time team with an annual allocated budget must run the WMU that will be responsible for the updating. • Periodic on-the-ground investigation and fieldwork must be undertaken to identify recyclers and collectors.
• Data received were not complete or in different formats or detail levels;	• A full-time team with an annual allocated budget must run the WMU that will be responsible for the compilation and collation of the various data sets for the Networking System.
• Difficult to get all to cooperate since there are no legal obligations for them to provide the required information	• Registration for all recycling businesses and operators should be considered at the Federal and/or local level in order to obtain more accurate data on recycling activities.
• Counterparts assigned have other responsibilities and duties thus were not fully involved in pilot project activities. • Commitment and time from focal person limited.	• Regular meetings, discussion and dialogue sessions must be undertaken with counterpart staff so that they are aware of the progress of pilot project and its activities. • Counterparts must be delegated tasks relevant to pilot project activities with set deadlines. • Fulltime staff with an annual allocated budget must man the WMU.

Table 6.5.5 Issues Encountered and Recommended Counter Measures (PP-II-2)

Issues Encountered	Counter Measures
Source Separation at Target Housing Areas	
• Poor response from residents to participate in the project.	• Continuous discussions and dialogue sessions with target groups. • Door to door canvassing to explain about the project • Brochures and pamphlets distributed to all households. • Banners and posters set up throughout the target area. • Find out "Champions" from the target groups.
• Pilferage of recycled material from bins placed for the source separation project by the regular garbage collection unit.	• Convince top management to give strong commitment • Newspaper article on source separation project • Monitoring of bins during regular garbage collection trips • Education and surveillance of collectors
Source Separation at Institution	
• Most departments do not effectively record or capture data on paper purchase, consumption, reused and recycled.(MPSJ complexes)	• Assigning/appointing at least one officer from each sub-unit to monitor the source separation project for their own department. • Data capture mechanism and ratio estimation for paper recycling project designed.
Source separation at Mega-mart	
• Differing ideas and views amongst external players on mechanism and facilities.	• Continuous discussions and dialogue sessions with all external players.
• External players will cooperate only if they have benefits in return.	• Continuous negotiation on all aspects of source separation project implementation.
• Red tape and bureaucracy procedures on all matters regarding agreements, contracts, permits and other matters related to implementation of source separation project	• Follow-up and repeated visits and meetings with all players to start the implementation.
• Volume of recyclable waste collected will not be sufficient to cover operating costs	• Campaigns and promotions to nearby residential and shopping areas to disseminate information regarding buy-back facility.

6.5.4 Recommendation for Future Action

(1) Recommendation for Waste Minimisation Unit (WMU)

The operation and management of the WMU established in the LAs under PP-II has been taken over by the respective LA at the end of the pilot project period. The WMU in the LA plays a central role in ensuring the sustainability of a 3Rs network. To guide the WMU in fulfilling its role and tasks, the recommendations outlined below are intended to strengthen and maintain the recycling network and data management system that have already been established for these LAs.

1) Data Collection, Monitoring and Updating

The WMU needs to continuously identify and monitor recycling stakeholders and update the recycling directory. This task must be adopted as a continuous process by WMU.

In tandem with the exercise to monitor and update the directory of recyclers, registration of all recycling businesses needs to be considered at the Federal or local level. This is crucial in order to obtain more accurate data on recycling activities and the state of recycling in the each LA area and the whole country.

The data information and management system must also be supported by a website that is to be maintained either by the LA officers or outsourced to a third party so that the information can be regularly updated and more importantly, accessible to the public.
Printing and dissemination of 3Rs educational and information materials is necessary to continuously inform and remind the public about their responsibility towards waste minimisation, how to go about doing it and the parties that can provide support and assistance.

2) Dissemination of Information and Formulation of Networking

Distribution of updated information to all relevant stakeholders must be carried out on a regular basis. It is recommended that the following be carried out to improve the communication and information dissemination.

- Regular press release and news;
- Regular updating and publication of information pimples e.g. general brochures, stakeholders directory; website contents;
- Development of on-line platform for 3Rs trading e.g. second hand shopping etc;
- Networking forum such as 3Rs networking workshop, technical meetings carried out at fixed interval.

3) Human Resources and Capacity Building

LA must consider allocating more resources in terms of budget and manpower to be more effective in waste Minimisation activities. The key staff handling the tasks of data handling and website updating must be sufficiently strengthened and trained. Alternatively, outsourcing some of these tasks should also be considered in view of the lack of manpower and the difficulty in creating new posts.

(2) Recommendation for Source Separation

Recommendations for strengthening and maintaining the source separation project for the three target areas are detailed below.

2) Household Source Separation

Prior to embarking on the programme, the LA/WMU needs to identify the "Champions" from amongst the residents to provide leadership, drive and commitment to the waste minimisation programme, and who would also serve as the chief liaison persons between the LA and the community. Preferably, these champions could be sourced from the residents' association, community groups, religious organisations or NGOs, that is, groups or persons who are respected by the community.

Furthermore, a more proactive role from the residents and their community committees has to be encouraged. WMU officers can do this via continuous visits and discussions with the residents committee, management companies and the private recyclers, either on a quarterly or semi-annual basis, to identify arising issues or problems, monitor progress, or basically, give encouragement.

Awareness campaigns need to be conducted at least once or twice a year by the LA, highlighting the benefits of 3R. These campaigns such as a recycling carnival should be undertaken to target the whole family.

3) Institutional Source Separation

Strong support from the management of the LA is essential to set the objective and momentum for recycling and waste separation in the office. In addition, the provision of necessary mechanism and infrastructure is crucial to initiate and sustain the programme.
Specific officers need to be designated within each department to be in charge of the project (currently there is already a list of designated officers in each department selected for the source separation project). However, this needs to be strengthened and improved in terms of responsibility and supervision. His/her main task would be to ensure assure that everyone is informed about the project, that the data of his/her department is circulated to the environmental officer in charge of the whole project. The task also includes acting as the liaison between the environmental officer and the staff of his/her department
A data collection system to collect all data (paper consumption, amount of paper reused, recycled, etc), monitor and evaluate the project must be implemented. To encourage participation, a competition could be organised on a monthly basis and the results posted on the bulletin board or office website.
Organising monthly meetings with the designated officers as well as other staff to keep them posted on the project implementation and progress is essential to monitor and check progress, response, feedback and/or any arising issues and problems.

4) Buy-back Source Separation

The success of any buy-back facility is dependent on promotion. Promotion activities should be carried out effectively via several media. These media may include:

- Conducting campaigns to surrounding areas to advertise the buy-back facility
- Distribution of leaflets including collecting schedule and services provided by buy-back centre
- Press release
- Door-to-door canvassing