

**THE STUDY
ON
RECYCLING INDUSTRY
DEVELOPMENT
IN
THE REPUBLIC OF THE PHILIPPINES
FINAL REPORT**

FEBRUARY 2008

JAPAN INTERNATIONAL COOPERATION AGENCY

EX CORPORATION

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PREFACE

In response to a request from Government of the Republic of the Philippines, the Government of Japan decided to conduct a study on Recycling Industry Development and entrusted to the study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team headed by Mr. Satoshi Sugimoto of EX CORPORATION between July 2006 and February 2008.

The team held discussions with the officials concerned of the Government of the Republic of the Philippines and conducted field surveys at the study area. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the promotion of this project and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of the Philippines for their close cooperation extended to the study.

February 2008

Seiichi NAGATSUKA,
Deputy Vice President
Japan International Cooperation
Agency

FEBRUARY 2008

Seiichi NAGATSUKA
Vice President
Japan International Cooperation Agency

LETTER OF TRANSMITTAL

“The Study on Recycling Industry Development in the Republic of the Philippines” has been conducted as the technical cooperation of Japan International Cooperation Agency with the following objectives:

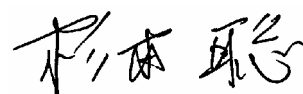
- (1) Policy Enhancement of the Board of Investments, Department of Trade and Industry of the Philippines (BOI/DTI) through formulation of the Master Plan and Action Plan for Recycling Industry Development;
- (2) Conduct of the case studies for evaluating the feasibility and effectivity of the policies and actions recommended in the Master Plan and Action Plan; and
- (3) Development of the policy formulation and implementation capacity of BOI/DTI and building partnership among the various key stakeholders (government, industry, and general public) in promotion of recycling industry in the Philippines.

Herewith, we officially inform successful completion of the Study with submission of the Final Report.

We would like to send our deepest appreciation to the Natural Resources and Energy Conservation Team of Economic Development Department, JICA Headquarters, JICA Philippines Office, Embassy of Japan in the Philippines, and all the other organizations in the Philippines and Japan who provided us great help in completing this Study.

We hope that the output of study and our technical cooperation help development of recycling industry and also contribute to sustainable development in the Philippines and further cooperation and friendship with Japan.

JICA Study Team
Team Leader
Satoshi SUGIMOTO



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Abbreviations

Abbreviation	Description
ADB	Asian Development Bank
AFTA	ASEAN Free Trade Area
ASEAN	Association of South East Asian Nations
BIS	Bureau of Importation Services
BOC	Bureau of Customs
BOT	Build-Operate-and-Transfer
BPS-DTI	Department of Trade and Industry-Bureau of Product Standard
CAR	Cordillera Administrative Region
CBO	Community-Based Organization
CCP	Carbonless Copy Paper
CDC	Clark Development Corporation
CEPT	Common Effective Preferential Tariff
CHRP	Commission on Human Rights of the Philippines
CIDA	Canadian International Development Agency
CIS	Commonwealth of Independent States
CLF	Countryside Loan Fund
COD	Chemical Oxygen Demand
CPA	Cebu Ports Authority
CPU	Central Processing Unit
CRT	Cathode Ray Tube
DA	Department of Agriculture
DANIDA	Danish International Development Assistance
DBP	Development Bank of the Philippines
DENR-EMB	Department of Environment and Natural Resources-Environmental Management Bureau
DILG	Department of the Interior and Local Government
DOF	Department of Finance
DOH	Department of Health
DOST	Department of Science and Technology
DTI-BOI	Department of Trade and Industry-Board of Investments
ELPB	National Ecolabelling Program Board
EO	Executive Order
EPS	Expandable Polystyrene
EU	European Union
FIES	Family Income and Expenditure Survey
GDP	Gross Domestic Products
GNP	Gross National Products
HDD	Hard Disk Drive
HDPE	High Density Polyethylene
HIPS	High Impact Polystyrene
HS Code	Harmonized Commodity Description and Coding System
I/A	Implementing Arrangement
IEC	Information, Education and Communication
IPP	Investment Priority Plan
IPP	Independent Power Provider
IRR	Implementing Rules and Regulations

Abbreviation	Description
ISO	International Organization for Standardization
ITDI	Industrial Technology Development Institute
ITH	Income Tax Holiday
IWEP	Industrial Waste Exchange Program
JBIC	Japan Bank For International Cooperation
KfW	Kreditanstalt für Wiederaufbau
LBP	Land Bank of the Philippines
LCD	Liquid Crystal Display
LDPE	Low Density Polyethylene
LGSP	Local Governance Support Program
LG-SWM	Local Government Solid Waste Management Plan
LGU	Local Government Unit
Li-Ion	Lithium-ion rechargeable battery
Li-polymer	Li-Polymer rechargeable battery
LSRM	Locally Sourced Recyclable Material
MEA	Metropolitan Electricity Authority
MERALCO	Manila Electric Company
MFN	Most Favored Nation
MICT	Manila International Container Terminal
MIRDC	Metal Industry Research and Development Center
MMDA	Metro Manila Development Authority
MMFEMPC (LINIS- GANDA)	Metro Manila Federation of Environment Multi-Purpose Cooperative
MOU	Memorandum of Understanding
MRF	Materials Recovery Facility
MT	Metric Ton
NCR	National Capital Region
NEA	National Electrification Administration
NEC	National Ecology Center
NEDA	National Economic Development Authority
NGO	Non Governmental Organizations
Ni-Cd	Nickel-Cadmium rechargeable battery
Ni-MH	Nickel-metal hydride battery
NPC	National Power Company
NPO	Non-Profit Organization
NSC	National Steel Corporation
NSCB	National Statistics Coordination Board
NSO	National Statistic Office
NSWMC	National Solid Waste Management Commission
NTC	National Telecommunications Commission
OFW	Overseas Filipino Workers
PCBs	Polychlorinated biphenyl
PET	Polyethylene Terephthalate
PHP	Philippine Peso
PNRI	Philippine Nuclear Research Institute
PNS	Philippine National Standards
PP	Polypropylene
PPA	Philippine Ports Authority
PPIA	Philippines Plastics Industry Association
PS	Polystyrene

Abbreviation	Description
PSCC	Philippine Standard Commodity Classification
PSIC	Philippine Standard Industrial Classification
PULPAPEL	Pulp and Paper Manufacturers Association of the Philippines
PVC	Polyvinyl Chloride
RA7942	Mining Act
RA9003	Ecological Solid Waste Management Act
RCE	Recyclable Collection Event
REC	Regional Ecology Center
RTWPB	Regional Tripartite Wages and Productivity Board
SC	Steering Committee
S/W	Scope of Work
SBMA	Subic Bay Metropolitan Authority
SEAISI	South East Asia Iron and Steel Institute
SME	Small and Medium-sized Enterprise
SWM	Solid Waste Management
TRM	Total Raw Material
TS	Task Force
TWC	Technical Working Group
UN	United Nations
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
WHO	World Health Organization

Introduction

Introduction - 1 Background and Objectives of the Study

The Ecological Solid Waste Management Act of 2000 (RA 9003), which was promulgated in January 2001 in the Philippines, officially declares to minimize solid waste all through its process, starting from generation followed by collection and treatment and ended with final disposal at landfills, without utilization of incineration technologies for the purpose of ensuring the safety of human health and protection of the environment as well as maximizing the efficient use of scarce natural resources.

RA9003 provides extensive measures of waste minimization including waste reduction at sources, reuse, recycling, and composting while it requires collaborative efforts of all the relevant stakeholders, i.e. government, business, NGOs, and citizens under the leadership of local government unit (LGU), who holds the primary responsibility for solid waste management (SWM) to achieve this common goal.

“The Local Government Solid Waste Management Plan”, which is provided in RA9003 to be formulated by each LGU, must include the implementation plan of the concrete measures to achieve the minimum target of diverting 25 percent of solid waste disposal amount within 5 years after the enforcement of the Act through reuse, recycling, composting and so forth.

Responding to enactment of RA9003, community-based collection system of recyclable materials has started to widely tested for full-scale implementation at some local and barangay levels, some of which have shown success and good examples for further application.

As to the recycling industries, the end-users of collected recyclable materials, their status of development varies with types of materials as well as localities. Domestic trade market of recyclable materials also fluctuates with the trend of international supply and demand of such materials, so that the domestic circulation of recyclable materials is not yet firmly established in the Philippines. Due to the dominant role of informal sector in distribution of recyclable materials, it is difficult to accurately capture the current material flow of major recyclables in terms of their quantity as well as quality. Lack of data and information on such recyclable materials impedes the development of stable trade market for these materials.

The dominance of small and medium recyclers in the Philippines is also problematic in terms of material consumption efficiency, proper management of work safety and environment, and pollution control. There are many potential areas of improvement in the current recycling practices for resource use efficiency and environmental management.

The Board of Investments, Department of Trade and Industry (BOI-DTI), as a core member of the National Solid Waste Commission (NSWMC), is mandated in RA9003 to carry out the following tasks in relation to promotion of recycling industries as well as creation and expansion of the recyclable materials market in the Philippines:

- Preparation of the inventory of existing markets for recyclable materials and examination of the measures to expand recyclable materials market;
- Examination of product standards for recyclables and recycled materials;
- Examination of the policies and measures to develop and promote recycling industries such as eco-labeling, green purchasing/procurement policies, labeling of product information, and so forth.

To formulate policies and measures to promote recycling industries in the Philippines for enforcement of RA9003, DTI-BOI made an official request for providing technical assistance to the Government of Japan (GOJ), that has enough experience in creating the partnership among the government, business, and general public to establish the material-cycle society as well as currently promotes 3R (Reduce, Reuse, Recycle) Initiative in the international society.

In response to the request of the Government of the Philippines (GOP), GOJ conducted the “Project Formulation Study” in October 2005 to validate the necessity of technical assistance based on the identification of current status and issues on recycling industry through data collection and discussions with relevant organizations in the Philippines. As a result, the Implementation Arrangement (I/A) has been signed between GOP and GOJ to conduct the current study with the following objectives:

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

Introduction - 2 Scope of the Study

In accordance with the Implementation Arrangement (I/A) signed in April 2006, the scope of the Study is determined as shown in Table Introduction 1.1.1.

Table Introduction 1.1.1 Scope of the Study

Region/Area Covered by the Study	All over the Philippines	
Target Recyclable Materials	Category I	Used papers (old newspaper, old magazine, cardboard, etc.), scrap metals (iron and aluminum), glass bottles, scrap plastics (PET, HDPE, LDPE, PVC, PP, PS)
	Category II	Cell-phone batteries, personal computers (PC), TV, refrigerator
Target Industries	All the industries potentially receiving and utilizing the recyclables defined above	

Introduction - 3 Organizational Framework for Implementation of the Study

The counterpart of the Study in the Philippines is DTI-BOI. The Study will also establish the Steering Committee (S/C) to be organized by the representatives from the following organizations for the purpose of obtaining the necessary consultation and assistance from the relevant authorities in the Philippines. The Steering Committee will be periodically informed of the progress of the Study and consulted with concerning the methods of study implementation.

- Board of Investments, Department of Trade and Industry (DTI-BOI)
- Environment Management Bureau, Department of Natural Resources and Environment (DENR-EMB)
- National Solid Waste Management Commission (NSWMC)
- Department of Interior and Local Government (DILG)

The S/C will be chaired by the representative from DTI-BOI while BOI will function as the Secretariat of S/C.

The Study will also organize the Technical Working Group (TWG) under the S/C. TWG will be organized by working-level officials from the similar member organizations of S/C and the JICA Study Team (JST) while BOI will chair TWG and function also as its secretariat. TWG will, when necessary, invite representatives from other organizations such as local government unit (LGU), private sector, NGOs, and so forth as the temporary member of TWG so that the Study can be conducted under the partnership between private and public sectors.

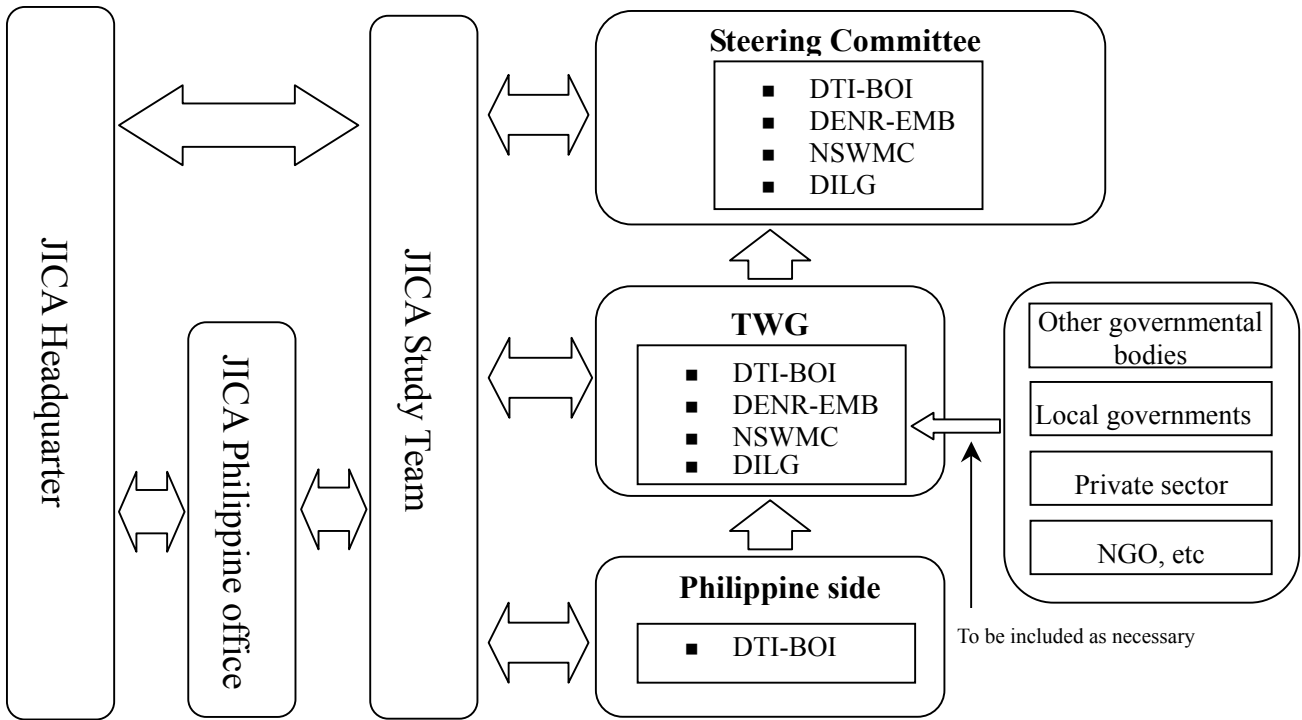


Figure Introduction -1.1.1 Organizational Framework for Implementation of the Study

Volume I: Current Status

1. Current Recycling Policies and Measures

1.1 General Background of the Philippines

Name	Republic of the Philippines Independent on July 4, 1946
Location / area	Latitude N4'23" – 21'25", Longitude E116' – 126'30" Area: 299,404 km ²
Geography	More than 7,000 islands are included in the Philippine archipelago, extending approximately 1,850 km from north to south. Large islands are Luzon, Cebu, Leyte, Negros and Mindanao. There are many active and inactive volcanoes as the islands lie on "Pacific Ring-of-Fire".
Temperature	Average annual temperature is around 30 degrees Celsius. June to October is considered rainy season, and March to May is considered as dry season.
Population / race	84.24 million (2004) Primary Malayan descended, with diverse racial mixture.
Languages	Official languages are English and Pilipino. Pilipino is largely based on Tagalog. There are more than 80 indigenous languages spoken in the Philippines. The most widely spoken are Tagalog, Cebuano, and Ilocano.
Religions	More than 90% of populations are Christians, predominantly Roman Catholic. There are also Aglipayan, Philippine Independent Church, Yglesias Christ, Iglesia ni Cristo, and other communions. Approximately 4 to 5 % of populations are Muslims, mainly in Mindanao.
National flag, national anthem	National flag was designed by one of the Leaders of Independence Revolution, Aguinaldo, when he was exiled in Hong Kong in 1898. Triangle on the left side expresses freedom, the 8 lights represent 8 provinces that fought for the independence, and 3 stars indicate Luzon, Visayas, and Mindanao. The blue stripe means peace and true justice, and bottom red stripe means patriotic spirit and courage. National anthem is "El Himno del Nacional Filipino" or "Lupang Hinirang" in Pilipino. The anthem is commonly called "National Anthem" in the Philippines.

Source: Philippine Business Handbook, 2006

1.2 Overview of Socio-economic Conditions

1.2.1 Population and Population Dynamics

According to the National Statistics Coordination Board, NSCB, annual population growth is around 2 %, which gives estimation of total population reaching 86 million in 2005 and 96 million in 2010. Comparing with the neighboring Asian countries, the Philippines shows the second highest population growth next to Malaysia while it has the highest population density (See Table 1.2.1). Such high population growth has a major impact upon economy of the Philippines, which is currently grown at the rate of 3.4% annually on average. The Philippines also shows a high dependent population ratio comparing with the neighboring countries due to its highest ratio of

younger generation below 15 years of age in spite of its low ratio of elderly population.

Table 1.2.1 Comparison of Population Growth in Neighboring Countries

Country	Population (million) ^{*1}	Population density (Km2) ^{*1}	Pop. age 15 or younger (%) ^{*2}	Pop. growth rate (%) ^{*3}	Avg. life expectancy ^{*4}	Infant mortality (in 1,000 Births) ^{*5}	Maternal mortality (in 100,000 pregnant) ^{*5}
Philippines	79.9	267	37.5	2.03	65/72	29	200
Indonesia	219.8	115	30.9	1.4	65/68	33	230
Malaysia	24.4	74	33.7	2.44	70/75	8	41
Thailand	62.8	122	26.3	1.04	69/73	24	44
Viet Nam	81.3	245	33.4	1.4	62/72	30	130

*1 2003, *2 2000, *3 00-05, *4 2002, *5 2001

Source: United Nations (2003), World Population Prospects, the 2002 Revision, WHO (2003), World Health Report 2003, United Nations (2004), World Urbanization Prospects, the 2003

As commonly found in many developing countries, population, economic activities and politics are all concentrated in the capital city, Metro Manila in the Philippines, where there is also a big gap in the level of socio-economic activities between urban and rural areas. The Philippines is divided into 16 administrative regions under which there are provinces, municipalities and local government units. The smallest administrative unit is barangay which is under municipalities and local government units.

Table 1.2.2 shows the estimation of population growth by regions in the period of 2000-2010. The National Statistic Office made the estimation on the basis of the Census in the year 2000.

Table 1.2.2 Estimated Population Growth Rate in the Philippines

Region	2000 Census	2000-2005 Growth rate	2005-2010 Growth rate
Philippines	76,498,735	2.05	1.95
National Capital Region	9,932,560	1.58	1.37
Cordillera Administrative Region	1,365,220	2.13	2.08
Region I-Ilocos	4,200,478	2.08	1.99
Region II-Cagayan Valley	2,813,159	1.75	1.73
Region III-Central Luzon	8,030,945	2.15	1.99
Region IV-S. Tagalog (A: Calabarzon)	9,124,554	2.46	2.22
Region IV-S. Tagalog (B: MIMAROP)	2,669,101	2.7	2.61
Region V-Bicol	4,674,855	1.93	1.92
Region VI-Western Visayas	6,208,733	1.95	1.94
Region VII-Central Visayas	5,701,064	2.05	2.01
Region VIII-Eastern Visayas	3,610,355	2.05	2.02
Region IX-: Zamboanga Peninsula	3,091,208	2.04	2.01
Region X-Northern Mindanao	2,747,585	2.12	2.08
Region XI-Southern Mindanao	5,189,335	1.67	1.63
Region XII-Central Mindanao	2,598,210	2.34	2.24
Autonomous Region in Muslim Mindanao	2,412,159	2.37	2.27
Caraga	2,095,367	1.91	1.9

Source: National Statistic Office

Table 1.2.3 Estimation of Population Growth based on the Census in 2000

Region	2000	2001	2002	2003	2004	2005	2006
Philippines	76,498,735	78,066,959	79,667,332	81,300,512	82,967,172	84,667,999	86,319,025
National Capital Region	9,932,560	10,089,494	10,248,908	10,410,841	10,575,332	10,742,422	10,889,593
Cordillera Administrative Region	1,365,220	1,394,299	1,423,998	1,454,329	1,485,306	1,516,943	1,548,495
Region I-Ilocos	4,200,478	4,287,848	4,377,035	4,468,077	4,561,013	4,655,882	4,748,534
Region II-Cagayan Valley	2,813,159	2,862,389	2,912,481	2,963,449	3,015,309	3,068,077	3,121,155
Region III-Central Luzon	8,030,945	8,203,610	8,379,988	8,560,158	8,744,201	8,932,201	9,109,952
Region IV-S. Tagalog (A: Calabarzon)	9,124,554	9,349,018	9,579,004	9,814,647	10,056,087	10,303,467	10,532,204
Region IV-S. Tagalog (B: MIMAROP)	2,669,101	2,741,167	2,815,179	2,891,189	2,969,251	3,049,421	3,129,011
Region V-Bicol	4,674,855	4,765,080	4,857,046	4,950,787	5,046,337	5,143,731	5,242,491
Region VI-Western Visayas	6,208,733	6,329,803	6,453,234	6,579,072	6,707,364	6,838,158	6,970,818
Region VII-Central. Visayas	5,701,064	5,817,936	5,937,204	6,058,917	6,183,125	6,309,879	6,436,708
Region VIII-Eastern Visayas	3,610,355	3,684,367	3,759,897	3,836,975	3,915,633	3,995,903	4,076,620
Region IX- Western Mindanao	3,091,208	3,154,269	3,218,616	3,284,276	3,351,275	3,419,641	3,488,376
Region X-Northern Mindanao	2,747,585	2,805,834	2,865,318	2,926,063	2,988,096	3,051,444	3,114,914
Region XI-Southern Mindanao	5,189,335	5,275,997	5,364,106	5,453,687	5,544,764	5,637,362	5,729,251
Region XII-Central Mindanao	2,598,210	2,659,008	2,721,229	2,784,906	2,850,073	2,916,765	2,982,101
Autonomous Region in Muslim Mindanao	2,412,159	2,469,327	2,527,850	2,587,760	2,649,090	2,711,873	2,773,433
Caraga	2,095,367	2,135,389	2,176,175	2,217,740	2,260,099	2,303,267	2,347,029
Population in the Philippines	76,464,888	78,024,835	79,617,268	81,242,873	82,902,355	84,596,436	86,240,685

Source: National Statistic Office

1.2.2 Government

(1) Government System

The Philippines is a constitutional republic country under the Constitution in 1987.

The President, the head of state, is elected by direct public election. The term of President is 6 years and no re-election is allowed (The term of Vice President is also 6 years with no re-election for the third term.). In case the president dies, becomes no longer able to proceed his/her function, resigns, or is removed from office, it is deputized in the order of the vice-president, the chairman of upper house (Congress), and chairman of lower house (House of Representatives).

The president has the authority to appoint cabinet members with the approval of the Commission on Appointments formed by upper and lower houses. Concurrent post of cabinet members with the member of the houses is prohibited. There is no provision regarding the number of cabinet members. The current cabinet headed by the President, Gloria Macapagal Arroyo has approximately 50 cabinet members.

The president's authorities include exercise of administrative power, supreme command of national armed forces, imposition of martial law, conclusion of international treaty, power of veto, and appointment of judges in the Supreme Court, and so forth. However, the President's power of appointment practically extends to the heads of local government through the Secretary of the Department of Interior and Local Government (DILG). In this sense, the president's power is stronger than the President of the United States although legislative branches keep a tight rein on exercise of these powers.

(2) Local Governments

1998 Constitution and the Local Government Code of 1991 established in Oct. 10, 1991, provides the local administration as follows:

Local administration is mainly divided into three levels, Province, City / Municipality, and Barangay (the smallest administrative unit). Each province is made of cities/municipalities while each city/municipality is made of Barangays. Cities are further categorized into 3 (three) types, i.e. Component City, Independent Component City, and Highly-Urbanized City.

There are 79 provinces, as of 2005. Each Province has a Governor, Vice-governor, and assembly (Sangguniang Panlalawigan).

There were 119 cities as of 2004. According to Local Government Code of 1991, the required conditions for municipalities / barangays to be recognized as a city or Independent city are: (1) Treasury Department recognizes that its average annual revenue of two consecutive year exceeds 20 million pesos; (2) Bureau of Land Management recognizes that its land area is at least 100km²; and (3) NSB acknowledges that its population is at least 150 thousand. On the other hand, the required conditions to become a Highly-Urbanized City are 50 million pesos of the average annual local

revenue for the two consecutive years and population of more than 200 thousands. Once city is officially recognized as the Highly-Urbanized City, city no longer belongs to the Province while the right to vote for the governor, vice governor, and state senators of the province it belonged before will be expired. Each city has the Mayor, Deputy Mayor, and city assembly (Sangguniang Panlungsod).

As of 2005, there were 1,610 municipalities in the Philippines. Each municipality has the Municipality Mayor, Deputy Mayor, and Municipality Assembly. The number of Barangays reached around 42,000 in 2005. Each Barangay has the publicly elected Barangay Captain and Barangay Assembly.

Metro Manila has its own assembly called “Metropolitan Manila Sangguniang Bayan” though it is not a legislative body, but a recommendation body to the Metro Manila Development Authority that is responsible for administration of Metro Manila region. There are also autonomous regions in the Philippines, i.e. Muslim Mindanao (ARMM), which is composed of 5 provinces (Sulu, Tawi-tawi, South Lanao, Magindanao, and Basilan) and the City of Malawi as well as Cordillera Administrative Region (CAR) consisting of 6 provinces (Abra, Benguet, Ifugao, Kalinga-Apayao in Northern Central Luzon mountainous area).

1.2.3 Economy

(1) Macro Economy

Although real economic growth rate had reached only around 3 % after the Asian Economic Crisis, its economy has recovered to have 4 – 6 % annual growth rate since 2002. In the year 2002, a high growth of mining sector at 3.9% because of increased natural gas production supported the economic growth while service sector, which occupied 50% of GDP, recorded 5.8 % growth and contributed to achievement of 4.5% growth of GDP in the year 2003. In the year 2004 and 2005, real GDP growth rate reached 6.0 and 5.3 % respectively in spite of increased crude oil prices and inflation.

Although the national economy shows its prosperous recovery in the Philippines, no clear solution has been found to address structural socio-economic issues such as growth of budget deficit, slumping of investment, high unemployment rate, and bad loans of financial institutes, and so forth. The fact that private expenditure, accounting more than 80% of GDP, is supported by huge remittance (anticipated to exceed \$10 billion for 2005) from overseas workers implies that there has no major development of domestic industry while many human resources are taken by foreign countries. Although the Philippines Government is trying to promote development and enhancement of domestic industries including SMEs, unemployment rate is still kept at 11% with no clear improvement of the country’s employment condition.

Table 1.2.4 Economic Outlook of 2002 – 2005

	2002	2003	2004	2005
Real GNP growth rate (%)	4.5	4.5	6.0	5.3
Agriculture & fishery	3.9	3.2	4.9	3.0
Mining & manufacturing	3.9	3.5	5.2	4.7
Service	5.1	5.8	7.1	6.6
Current account (mil \$)	4,383	1,396	2,080	2,499
Export (mil \$)	3,5208	36,231	39,598	41,223
Import (mil \$)	35,427	37,497	40,297	44,910
Trade valance (mil \$)	-219	-1,266	-699	-3,687
BOI invest approved (mil peso)	8,815	8,349	127,889	
EZA invest approved (mil peso)	22,796	24,923	41,537	
SBMA, CDC investment approved (mil peso)	14,437	739	4,469	
Inflation rate (%)	3.1	3.1	6.0	7.6
Unemployment rate (%)	11.4	11.4	11.8	11.9
Peso/US\$ rate (ann. avg)	51.06	54.20	56.04	55.70

Source: JETRO, White paper on trade investment, NSB

Table 1.2.5 Comparison of Macro Economy Indicators between Philippines and Neighboring Countries

Country	Items	2000	2001	2002	2003	2004
Philippines	Population (million)	78.4	80.1	81.8	83.5	85.0
	GDP (Current US\$ billion)	75.9	72.0	78.0	80.6	82.8
	GDP per capita (US\$)	968	899	953	965	974
	GDP growth (%)	4.4	3.0	4.4	4.5	6.1
	Industry GDP (%)	32.3	32.4	32.5	32.3	32.0
	Inflation rate (%)	4.4	6.1	3.1	3.5	5.5
	Unemployment rate (%)	10.1	9.8	10.2	11.4	11.8
Thailand	Population (million)	62.4	62.9	63.4	63.9	64.2
	GDP (Current US\$ billion)	122.7	115.5	126.8	143.0	156.2
	GDP per capita (US\$)	1,966	1,836	2,000	2,238	2,433
	GDP growth (%)	4.6	2.1	5.4	6.7	6.1
	Industry GDP (%)	42.0	42.1	42.7	44.0	44.9
	Inflation rate (%)	1.6	1.6	0.7	1.8	2.7
	Unemployment rate (%)	2.4	2.6	2.4	2.2	2.1
Malaysia	Population (million)	23.5	24.0	24.5	25.0	25.6
	GDP (Current US\$ billion)	90.3	88.0	95.2	103.7	111.1
	GDP per capita (US\$)	3,843	3,667	3,886	4,138	4,340
	GDP growth (%)	8.3	0.4	4.2	5.2	7.1
	Industry GDP (%)	50.7	48.2	47.3	48.5	48.9
	Inflation rate (%)	1.5	1.4	1.8	1.2	1.4
	Unemployment rate (%)	3.1	3.6	3.5	3.6	3.5
Indonesia	Population (million)	206.3	208.7	211.1	213.6	218.1
	GDP (Current US\$ billion)	150	143	173	208	210
	GDP per capita (US\$)	728	685	820	974	963
	GDP growth (%)	4.8	3.3	3.7	4.1	5.1
	Industry GDP (%)	46.1	45.6	44.2	43.6	43.1
	Inflation rate (%)	9.6	10.8	7.2	5.1	6.4
	Unemployment rate (%)	6.1	8.1	8.9	9.1	9.6
Vietnam	Population (million)	77.6	78.7	79.7	80.8	82.1
	GDP (Current US\$ billion)	31.2	32.7	35.1	39.5	45.3
	GDP per capita (US\$)	402	416	440	489	552
	GDP growth (%)	6.8	5.8	7.1	7.3	7.7
	Industry GDP (%)	36.7	38.1	38.5	39.5	40.1
	Inflation rate (%)	-1.6	-0.4	4.0	3.0	9.5

(2) Economic Plan

The economic plan of the 2nd term of Arroyo administration is published as the Mid-term Development Plan of 2004-2010 with its focus on growth of economy and creation of employment. The government recognizes that the major obstacles for investment promotion and trade expansion in the Philippines are the major shift of foreign capital investment to China, deficit of national budget, security, and underdeveloped infrastructure.

Table 1.2.6 Mid-term Economic Plan of 2nd Arroyo Administration (2004 – 2010)
Target figures in Macro Economy

	2004	2005	2006	2007	2008	2009	2010
GNP (%)	5.2-6.0	5.5-6.4	6.5-7.5	6.9-7.8	7.0-8.0	7.2-8.2	7.2-8.2
GDP (%)	4.9-5.8	5.3-6.3	6.3-7.3	6.5-7.5	6.8-7.8	7.0-8.0	7.0-8.0
Inflation (%)	4.0-5.0	4.0-5.0	4.0-5.0	3.0-4.0	3.0-4.0	3.0-4.0	3.0-4.0
Treasury bonds	7.5-8.5	7.5-8.5	7.5-8.5	6.7-7.5	6.5-7.5	6.5-7.5	6.5-7.5
Budget deficits	6.7	6.0	5.3	4.6	3.9	3.0	1.0
Export (mil \$)	43,058	47,452	52,296	58,204	65,385	74,282	84,309
Import (mil. \$)	47,157	52,730	58,455	65,336	73,624	83,510	94,691
Unemployment rate (%)	12.1	11.9	11.6	11.1	10.4	9.7	8.9
Peso/US\$ rate	54-56	55-57	55-57	55-57	55-57	55-57	55-57

Source: JETRO White paper on trade investment, NSB

The major actions to be taken in the economic plan above as follows:

- ◆ Develop and strengthen SMEs through provision of financial and technical assistance, as well as market development,
- ◆ Strengthening international competition through lowering of electricity price, reduction of distribution cost by developing transportation infrastructure, technology/productivity development and improvement, and elimination of bureaucratic practices,
- ◆ Strategic industry development with the focus on advanced technology sector (software, BPO, call centers, fashion/apparel, jewelries, medical service, automobiles, electronics, and health care), medium technology sector (agriculture, mining, tourism, hotels, restaurants, and leisure), and simple technology fields (construction, SMEs, micro-businesses)

(3) Trade

1) Outlook

During 2002-2005, the Philippines industries were restructured to accommodate trade liberalization and strengthened regional trade relationship under the development of ASEAN Free Trade Area (AFTA).

Although its growth rate was declined due to worldwide recession of IT businesses, the export of electronic products, as the major export commodities, reached 28.5 billion US dollars in 2005, accounting for 70% of the total export value in the Philippines. However, the electronic industry

itself was reorganized under the serious competition by which some of the computer manufacturers and cell phone service providers were out of business.

Table 1.2.7 Export by Major Commodity Types (2002 – 2005)

(Unit: million \$, %)

	2002			2003			2004			2005		
	Value	%	Growth rate	Value	%	Growth rate	Value	%	Growth rate	Value	%	Growth rate
Industrial products	26,713	75.9	12.4	27,059	74.7	1.3	30,325	76.6	12.1	32,502	78.8	7.2
Electronics	24,322	69.1	12.5	24,168	66.7	-0.6	26,646	67.3	10.3	28,504	69.2	7.0
Machinery	1,511	4.3	23.6	1,841	5.1	21.8	2,373	6.0	28.9	1,834	4.4	-22.7
Consumer goods	3,662	10.4	-3.0	3,522	9.7	-3.8	3,438	8.7	-2.4	3,596	8.7	4.6
Clothing	2,306	6.5	0.3	2,179	6.0	-5.5	2,084	5.3	-4.3	2,298	5.6	10.3
Furniture	316	0.9	6.5	278	0.8	-12	294	0.7	5.8	304	0.7	3.4
Food	1,396	4.0	6.7	1,566	4.3	12.2	1,579	4.0	0.8	1,935	4.7	22.5
Natural resources	1,720	4.9	6.2	2,201	6.1	28.0	2,509	6.3	14.0	1,837	4.5	-26.8
Total (inc. other)	35,208	100.0	9.5	36,231	100.0	2.9	39,598	100.0	9.3	41,223	100.0	4.1

Source: JETRO White paper on trade investment, NSB

Table 1.2.8 Import by Major Commodity Types (2002 – 2005)

(Unit: million \$, %)

	2002			2003			2004			2005		
	Value	%	Growth rate	Value	%	Growth rate	Value	%	Growth rate	Value	%	Growth rate
Industrial products	24,915	70.3	26.9	26,668	71.1	7.0	27,367	67.9	2.6	32,647	72.7	19.3
Electronics	9,950	28.1	28.4	11,097	29.6	11.5	11,512	28.6	3.7	12,177	27.1	5.8
Machinery	2,883	8.1	-1.4	30,969	8.3	7.4	3,115	7.7	0.6	3,652	8.1	17.2
Consumer goods	1,371	3.9	2.3	1,509	4.0	10.1	1,617	4.0	7.2	2,014	4.5	24.6
Clothing	33	0.1	0.9	33	0.1	-0.9	32	0.1	-3.2	80	0.2	150
Furniture	47	0.1	8.3	44	0.1	-5.0	43	0.1	-3.3			
Food	2,283	6.4	7.7	2,163	5.8	-5.3	2,409	6.0	11.4	1,935	4.3	-19.7
Natural resources	5,777	16.3	-1.3	6,242	16.6	8.1	7,392	18.3	18.4	7,742	17.2	4.7
Total (inc. other)	35,427	100.0	19.9	37,497	100.0	5.8	40,297	100.0	7.5	44,910	100.0	11.4

Source: JETRO White paper on trade investment, NSB

2) Trade Balance

There has been no change in the country's trade deficit. During 2002-2005, the annual trade deficit in the Philippines ranged from 200 million to 3.7 billion US dollars. In the year 2003, the trade deficit reached about 1.2 billion US dollars due to slump of electronic products export and drastic increase of import from China. Electronics industry in the Philippines imports most of its parts from overseas, and then export the processed and assembled goods. Since the Philippines electronic industry is the assemblers that import most of the electronic components and parts, the condition of their import represent its business climate. Although electronic products export increased with the worldwide recovery of IT business in 2004, the Philippines still recorded trade deficit of 700 million US dollars due to rise of crude oil price and import. The trade deficit in 2005

is anticipated to reach 3.7 billion US dollars. The trade in the Philippines still depends upon the currently stagnated export processing industries while the increase in price of crude oil accelerates the deficit.

3) Major Trade Partner Countries

Although the United States had been the major trade partner for the Philippines, Japan became the largest exporting destination in 2004. In this year, the total export to Japan reached 8 billion US dollars with 38% increase from the previous year, contributing 20% of the total export in the Philippines. The export to China has also been increasing by 50% annually for the past few years, reaching 4 billion US dollars with 10% of the total export in the Philippines in 2005. Since China has been developing labor-intensive processing/assembly industries, the export of electronic components and semi-conductors is currently booming. The imported electronics components are assembled into final products in China and exported to all over the world.

Table 1.2.9 Export by Country / Region (2002 – 2005)

(Unit: million \$, %)

	2002			2003			2004			2005		
	Value	%	Growth Rate	Value	%	Growth Rate	Value	%	Growth Rate	Value	%	Growth Rate
Japan	5,295	15.0	4.4	5,796	15.9	8.9	7,964	20.1	38.1	7,204	17.5	-9.5
U.S.	8,570	24.3	-3.2	7,233	20.0	-15.6	6,714	17.0	-7.2	7,401	17.0	10.2
EU25	6,364	18.1	2.5	5,880	16.2	-7.6	6,502	16.4	10.6	5,359	13.0	-17.6
China	1,356	3.9	70.7	2,145	5.9	58.2	2,652	6.7	23.7	4,068	9.9	53.4
Hong Kong	2,359	6.7	48.2	3,094	8.5	31.2	3,139	7.9	1.5	3,338	8.1	6.3
Taiwan	2,485	7.1	16.1	2,492	6.9	0.3	2,188	5.5	-12.2	1,885	4.6	-13.8
S. Korea	1,339	3.8	28.0	1,314	3.6	-1.9	1,113	2.8	-15.3			
Singapore	2,472	7.0	6.4	2,431	6.7	-1.7	2,630	6.6	8.2	2,706	6.6	2.9
Malaysia	1,653	4.7	48.6	2,463	6.8	49.0	2,062	5.2	-16.3	2,457	6.0	19.2
Thailand	1,083	3.1	-21.1	1,234	3.4	13.9	1,062	2.7	-13.9	1,168	2.8	10.0
Indonesia	205	0.6	52.0	296	0.8	44.4	386	1.0	30.7			
Total (inc. other)	35,208	100.0	9.1	36,231	100.0	2.9	395,598	100.0	9.3	41,223	100.0	4.1

Source: JETRO White paper on trade investment, NSB

Table 1.2.10 Import by Country / Region (2002 – 2005)

(Unit: million \$, %)

	2002			2003			2004			2005		
	Value	%	Growth Rate	Value	%	Growth Rate	Value	%	Growth Rate	Value	%	Growth Rate
Japan	7,233	20.4	14.1	7,641	20.4	5.6	7,445	18.5	-2.6	7,646	17.0	2.7
U.S.	7,281	20.6	27.9	7,399	19.7	1.6	6,583	16.3	-11.0	7,970	17.7	21.1
EU25	2,754	7.8	-5.2	3,016	8.0	9.5	3,298	8.2	9.3			
China	1,252	3.5	29.2	1,797	4.8	43.6	2,533	6.3	40.9	2,890	6.4	14.1
Hong Kong	1,583	4.5	24.7	1,601	4.3	1.2	1,714	4.3	7.0	1,904	4.2	11.1
Taiwan	1,784	5.0	1.9	1,861	5.0	4.3	2,942	7.3	58.1	3,356	7.5	14.1
S. Korea	2,754	7.8	32.3	2,401	6.4	-12.8	2,482	6.2	3.4	2,187	4.9	-11.9
Singapore	2,311	6.5	24.0	2,542	6.8	10.0	3,079	7.6	21.1	3,595	8.0	28.6
Malaysia	1,293	3.6	28.5	1,359	3.6	5.1	1,707	4.2	25.7	1,701	3.8	0.4
Thailand	1,052	3.0	16.1	1,361	3.6	29.3	1,507	3.7	10.8			
Indonesia	765	2.2	-1.9	829	2.2	8.4	935	2.3	12.8			
Total (inc. other)	35,427	100.0	13.3	37,497	100.0	5.8	40,297	100.0	7.5	44,910	100.0	11.4

Source: JETRO White paper on trade investment, NSB

4) Trade Relationship with Japan

With the highest record of export from the Philippines, Japan became the largest export destination in 2004. This is mainly due to the increase in export of electronic products, accounting for approximately 70% of the total export to Japan. Among the electronics products, the export of LCD (Liquid Crystal Display) is drastically increasing while the other electronic components and semi-conductors are also increasing their percentage in the total export to Japan.

On the other hand, import from Japan has decreased in major items including electronic processing equipments, electronic components, semi-conductors, automobile parts, and machineries. This is because of the fact that Japanese Companies in the Philippines has started to shift their procurement of materials from Japan to ASEAN countries and China with the progress of AFTA.

Table 1.2.11 Major Export to Japan (2002 – 2005)

(Unit: million \$, %)

	2002			2003			2004			2005		
	Value	%	Growth rate	Value	%	Growth rate	Value	%	Growth rate	Value	%	Growth rate
Industrial products	4,036	76.4	8.1	4,413	76.5	9.0	6,593	82.8	49.4	5,904	82.0	-10.5
Electronics	3,380	64.0	6.4	3,642	63.1	7.3	5,608	70.4	54.0	4,844	67.2	-13.6
Machinery	479	9.1	23.0	563	9.8	17.7	732	9.2	29.9	713	9.9	-2.6
Consumer goods	268	5.1	-10.7	266	4.6	-0.9	243	3.1	-8.6	264	3.7	8.6
Clothing	71	1.3	-6.3	62	1.1	-13.1	61	0.8	-0.7	58	0.8	-4.9
Furniture	20	0.4	-25.7	16	0.3	-21.0	13	0.2	-16.7	12	0.2	-7.7
Food	381	7.2	-2.0	369	6.4	-3.2	392	4.9	6.2	378	5.2	-3.6
Natural resources	260	4.9	-17.2	297	5.2	14.3	343	4.3	15.5	380	5.3	10.8
Total (inc. other)	5,280	100.0	4.4	5,769	100.0	8.9	7,964	100.0	38.1	7,203	100.0	-9.6

Source: JETRO White paper on trade investment, NSB

Table 1.2.12 Major Imports from Japan (2002 – 2005)

(Unit: million \$, %)

	2002			2003			2004			2005		
	Value	%	Growth rate	Value	%	Growth rate	Value	%	Growth rate	Value	%	Growth rate
Industrial products	6,560	94.3	15.6	7,278	95.3	6.9	7,022	94.3	-3.5	7,362	96.3	4.8
Electronics	3,223	46.3	55.2	3,458	45.3	6.8	3,349	45.0	-3.1	2,923	38.2	-12.7
Machinery	1,167	16.8	10.0	1,220	16.0	3.0	1,119	15.0	-8.3	1,223	16.0	9.3
Consumer goods	96	1.4	14.8	94	1.2	-2.1	96	1.3	2.7	88	1.2	-8.3
Clothing	-	-	-	-	-	-	-	-	-	-	-	-
Furniture	11	0.2	59.1	5	0.1	-52.1	2	0.0	-63.2	5	0.1	150.0
Food	8	0.1	30.2	9	0.1	9.8	7	0.1	-22.3	13	0.2	85.7
Natural resources	175	2.5	-13.0	176.0	2.3	0.0	212	2.9	20.7	126	1.6	-40.6
Total (inc. other)	6,956	100.0	14.1	7,641	100.0	5.6	7,445	100.0	-2.6	7,647	100.0	2.7

Source: JETRO White paper on trade investment, NSB

(4) Investment

Although direct investment had been decreasing since late 1990s, it turned around to increase in 2004. About 50% of foreign direct investment comes from Japan and the United States while Korea recently increases its investment in the Philippines. Korea took over Japan and became the second largest to the United States in number of visitors in 2005. The rising presence of Korea in the Philippines can be found in number of tourists, number of Korean schools, as well as investment in the Philippines especially the power sector. The investment from Korea is expected to show another drastic increase in 2005 while it will continue in 2006 and further with the investment in mega project such as large shipbuilding plant development.

Investment is steadily increased with the manufacturing industry as the main actor. Due to steep decrease of investment in 2004, its growth in 2005 reached more than 100% with the total investment of 43.8 billion PhP. However, most of them are additional investment for the expansion of the existing businesses while the number of new investment is very limited. In the year 2005, investment in semi-conductor and electronic sectors is remarkable with more than 70% increase against the previous year. In addition, investment in mining and energy is expected to increase in 2006, reaching 18 billion PhP, due to the Supreme Court's decision of sanctioning the constitutionality of Mining Law (RA7942) in which 100 % foreign equity is allowed in energy-related development projects.

Investment increase in service sector represents the booming of call centers and stable investment in computer software businesses.

Table 1.2.13 Direct Investment by Industry Types (2002 – 2005)

(Unit: million \$, %)

	2002			2003			2004		
	Value	%	Growth Rate	Value	%	Growth rate	Value	%	Growth rate
Gas				1,827	5.4		96,524	62.1	5,182.6
Manufacturing	23,691	51.4	-26.5	20,634	60.7	-12.9	43,836	28.2	112.4
Service	5,114	11.1	-36.8	4,609	13.6	-9.9	11,196	7.2	142.9
Electricity	997	2.2		103	0.3	-89.6	2,040	1.3	1872.7
Construction	125	0.3	-70.0	2,567	7.5	1,947.3	1,138	0.7	-55.7
Financial / real estate	564	1.2	-86.5	901	2.6	59.6	291	0.2	-67.7
Mining	11,589	25.2	326.9	856	2.5	-92.6	230	0.1	-73.2
Communication	1,054	2.3	-92.7	1,188	3.5	12.7	0	0.0	-
Transportation	2,054	4.5	60,317.6	192	0.6	-90.6	27	0.0	-86.2
Agriculture	98	0.2	-10.7	25	0.1	-74.2	5	0.0	-79.8
Total (inc. other)	46,049	100.0	-26.2	34,010	100.0	-26.1	155,509	100.0	357.2

Source: JETRO White paper on trade investment, NSB

Table 1.2.14 Direct Investment by Country / Region (2002 – 2005)

(Unit: million \$, %)

	2002			2003			2004		
	Value	%	Growth Rate	Value	%	Growth rate	Value	%	Growth rate
Japan	17,054	37.0	-25.9	8,841	26.0	-48.2	26,596	17.1	200.8
U.S.	3,627	7.9	-56.6	10,432	30.7	187.6	9,001	5.8	-13.7
Germany	2,555	5.5	666.8	452	1.3	-82.3	1,245	0.8	175.4
G. Britain	618	1.3	-63.6	2,381	7.0	285.3	1,683	1.1	-29.3
Netherlands	269	0.6	170.8	3,866	11.4	1,339.4	1,473	0.9	-61.9
S. Korea	1,345	2.9	-51.5	712	2.1	-47.0	3,260	2.1	357.8
Taiwan	12,198	26.5	1,895.7	2,554	7.5	-79.1	1,654	1.1	-35.2
Hong Kong	134	0.3	-52.1	256	0.8	91.4	1,369	0.9	435.3
Singapore	1,168	2.5	-92.6	295	0.9	-74.8	1,524	1.0	416.6
Australia	46	0.1	-98.8	986	2.9	2,028.9	170	0.1	-82.7
Total (inc. others)	46,049	100.0	-26.2	34,010	100.0	-26.1	155,509	100.0	357.2

Source: JETRO White paper on trade investment, NSB

1.3 Laws and Regulations

In the Philippines, there are several law and regulations relevant to recycling: the Ecological Solid Waste Management Act of 2000 (RA9003), Executive Order 301, and Department of Environment and Natural Resources Administrative Order No. 1994-28, No. 1997-28, No. 2004-27, and No. 2004-66. RA9003 provides a framework to promote recycling under the comprehensive program of solid waste management. The DENR Administrative Orders regulate importation of recyclable materials containing hazardous substances. Although there is no item-specific recycling law introducing EPR (Extended Producer Responsibility) at present, the National Solid Waste Management Commission has drafted a DENR Administrative Order on EPR specifically focused on electronic waste.

1.3.1 The Ecological Solid Waste Management Act of 2000 (RA9003)

RA9003 provides a comprehensive policy framework to address solid waste management issues. It consists of institutional mechanism, incentives, prohibited acts of recyclable dealers, penalties, and financial assistance in relation to SWM. The table below illustrates the provisions in RA9003.

Table 1.3.1 Main Provisions of RA9003

Item	Provisions
Institutional Mechanism	<ul style="list-style-type: none"> ➤ Designation of DENR to be responsible for the implementation of RA9003 ➤ Establishment of National Solid Waste Management Commission ➤ Establishment of National Ecology Center ➤ Establishment of Provincial Solid Waste Management Board ➤ Establishment of City or Municipal Solid Waste Management Board
Policy Framework	<ul style="list-style-type: none"> ➤ Preparation of National Solid Waste Status Report by DENR ➤ Formulation and implementation of National Solid Waste Management Framework by NSWMC ➤ Preparation of Local Government Solid Waste Management Plan by each LGU

Item	Provisions
Specific Action	<ul style="list-style-type: none"> ➤ Mandatory segregation of waste at source ➤ Provision of minimum standard for collection and transport of solid waste ➤ Provision of recycling program ➤ Encouragement of composting through development of inventory and guidelines ➤ Promotion of environmentally sound waste disposal by provision of guidelines for controlled dumps and criteria for sanitary landfill ➤ Increasing LGUs' capacity of solid waste management through guidelines for identification of common solid waste management problems and establishment of common waste treatment and disposal facilities
Incentives	<ul style="list-style-type: none"> ➤ Provision of rewards, subsidy, fiscal and non-fiscal, financial assistance, to LGUs for effective SWM
Fund Raising	<ul style="list-style-type: none"> ➤ Solid Waste Management Fund will be established to provide financial assistance for development of products, facilities, technologies and processes to enhance proper solid waste management, as well as to support award, incentives, research program, IECs and monitoring activities in terms of financing, technology, and capacity development. ➤ LGUs are entitled to impose SWM fees required for preparation and implementation of their own solid waste management plans.

Major roles of relevant stakeholders are defined in RA9003 as follows:

Table 1.3.2 Roles of Stakeholders for Ecological Solid Waste Management Defined by RA9003

Stakeholder	Major Role
National Solid Waste Management Commission (NSWMC)	Oversee the implementation of solid waste management plans and prescribe policies to achieve the objectives of the Act
National Ecology Center (under NSWMC)	Provide consulting, information, training and networking services for the implementation of the provisions of the Act
Department of Environment and Natural Resources (DENR)	Issue rules and regulations to implement the Act, provide support to LGUs, and identify the progress of the implementation of the Act
Department of Trade and Industry (DTI)	Facilitate waste recycling and re-use
Local Government Units (LGUs)	Implement and enforce the provisions of the Act within their respective jurisdictions
Barangay	Conduct segregation and collection of solid waste (biodegradable, compostable and reusable wastes)
Municipality/City	Collect non-recyclable materials and special wastes
Provincial Solid Waste Management Board	Develop and implement a provincial solid waste management plan from the submitted solid waste management plans of the respective city and municipal solid waste management boards
City or Municipal Waste Management Board	Prepare, submit and implement a plan for the safe and sanitary management of solid waste generated in areas under its geographic and political coverage
Multi-purpose cooperatives and associations	Undertake activities to promote the implementation and/or directly undertake projects in compliance with the provisions of the Act
Household, institutional, industrial, commercial, and agricultural waste sources	Conduct waste segregation

RA9003 and its Implementing Rules and Regulations (IRR) define the responsibilities of relevant stakeholders to promote recycling as follows:

Table 1.3.3 Responsibility of Stakeholders for Recycling Defined by RA9003 and Its IRR

Stakeholder	Responsibility under Recycling Program
National Solid Waste Management Commission (NSWMC)	<ul style="list-style-type: none"> • Encourage national and local agencies and organizations to purchase environmentally preferable products and services • Prepare a list of non-environmentally acceptable products and make it available to the public through the solid waste management information database • Establish procedures, standards and strategies to market recyclable materials and develop the local market for recycled goods (together with National Ecology Center, DTI, Department of Finance)
National Ecology Center (NEC)	<ul style="list-style-type: none"> • Assist LGUs in establishing and implementing deposit or reclamation programs in coordination with manufacturers, recyclers and generators to provide separate collection systems or convenient drop-off locations for recyclable materials and particularly for separated toxic components of the waste stream like dry cell batteries and tires to ensure that they are not incinerated or disposed of in a landfill <ul style="list-style-type: none"> ○ Conduct a detailed study on feasible reclamation programs and buyback centers ○ Cooperate with respective LGUs in formulation of the related ordinances
Department of Trade and Industry (DTI)	<ul style="list-style-type: none"> • Publish a study of existing markets for processing and purchasing recyclable materials and the potential steps necessary to expand these markets • Conduct a study into product standards for recyclable and recycled materials and provide the results of the study and any subsequent guidelines or standards formulated to the public through the NEC database • Formulate and implement a coding system for packaging materials and products to facilitate waste recycling and re-use based on ISO 14024 (Bureau of Product Standards)
Department of Agriculture (DA)	<ul style="list-style-type: none"> • Publish and annually update an inventory of existing markets and demands for composts • Assist the compost producers to ensure that the compost products conform to fertilizer standards set by DA
Local Government Units (LGUs)	<ul style="list-style-type: none"> • Arrange for long-term contracts to purchase a substantial share of the product output of the facility that produces goods from post-consumer and recovered materials generated in the jurisdiction of the LGU whenever appropriate
Barangay	<ul style="list-style-type: none"> • Collect, segregate, and recycle biodegradable, recyclable, compostable and reusable wastes • Establish Materials Recovery Facility (MRF) (by one or cluster of Barangays)
Household, institutional, industrial, commercial, and agricultural sources	<ul style="list-style-type: none"> • Sort and segregate biodegradable and non-biodegradable wastes

1.3.2 Executive Order 301 of 2004

Executive Order 301 requires all government departments, offices and agencies to establish their respective “Green Procurement Program.” The purposes of this program are as follows:

- To promote the culture of making environmentally friendly decisions in government, especially in the purchases and use of different products.
- To include environmental criteria in public tenders, whenever possible and practicable.
- To establish the specifications and requirements for environmentally friendly products and services.
- To develop incentive programs for suppliers of environmentally friendly products and services.

Major roles of relevant stakeholders for establishing a green procurement program are defined by EO301 as follows:

Table 1.3.4 Roles of Stakeholders for Establishing a Green Procurement Program

Stakeholder	Major Role
All government departments, offices and agencies	<ul style="list-style-type: none"> • Establish and submit their respective “Green Procurement Program” to ELPB (by October 2004)
National Ecolabelling Program Board (ELPB)	<ul style="list-style-type: none"> • Submit a regular report to the Office of the President on the performance and compliance of the different agencies with the Order • Serve as a competent third-party verifier of claims on the environmental friendliness of products and services • Provide a list of all certified environmentally friendly products. The list will be updated regularly to reflect additions or deletions based on criteria to be established by ELPB
Department of Trade and Industry (DTI)	<ul style="list-style-type: none"> • Ensure allocation of the fund for implementation of the Ecolabelling Program in the Philippines

1.3.3 DENR Administrative Orders to Regulate Recyclable Materials Containing Hazardous Substances

In the Philippines, DENR Administrative Orders No. 1994-28, No. 1997-28, No. 2004-27, and No. 2004-66 regulate the importation of recyclable materials containing hazardous substances for recovery, recycling and reprocessing. Such activities may be allowed upon obtaining prior written approval from the Secretary of the Department of Environment and Natural Resources or his duly authorized representative.

(1) Regulated Materials

The recyclable materials containing hazardous substances may be imported if they meet the limiting conditions as described in Table 1.3.5.

Table 1.3.5 Recyclable Materials Containing Hazardous Substances that may be Imported subject to the Corresponding Limiting Conditions

Category	Specific Item	Limiting Conditions
1. Scrap Metals	a. Scrap and waste containing precious metals and their alloys of: <ul style="list-style-type: none"> • Gold • Platinum (which include iridium, osmium, palladium, rhodium and ruthenium) • Silver 	All materials under this category should not contain radioactive materials such as Cesium (Cs), Cobalt (Co), Americium (Am), Strontium (Sr), lanthanide, actinide and others as determined by PNRI. The alloys or metals do not contain mercury and its compounds.
	b. Metal sludge containing precious metals and all associated metals	
	c. Ferrous waste and scrap for remelting <ul style="list-style-type: none"> • Cast iron • Stainless steels • Other alloy steels • Tinned iron or steel • Turnings, shavings, chips, milling waste, fillings, trimmings and stampings • Scraping • Used iron and steel nails 	
	d. Non-ferrous scraps and alloys.	
	e. Other metal bearing waste arising from melting, smelting and refining of metals of: <ul style="list-style-type: none"> • Hard zinc spelter • Zinc containing drosses such as galvanizing slab zinc top dross (>90% Zn); slab zinc bottom dross (>92% Zn); Zinc die cast dross (>85% Zn); Hot tip galvanizers zinc dross (>92% Zn) • Zinc skimmings • Slags from processing for further refining 	
	f. Lead-acid batteries	All used lead-acid batteries imported must be free of extraneous materials and properly packed to prevent leakages. Only recycling facilities with capacity to handle and treat battery acid solution and have an environmentally sound disposal plan for the residual wastes generated will be allowed to import.
2. Solid Plastic Materials	a. Waste parings and scrap of plastics	No importation of heterogeneous and unsorted plastic materials shall be allowed. All plastics should have no traces of toxic materials like asbestos All residuals of recycled material which contain hazardous substances without any acceptable disposal methods in the Philippines must be shipped back.
	b. Polymerized or co-polymerized	
	c. Resins of condensation products	

Category	Specific Item	Limiting Conditions
3. Electronic Assemblies and Scrap	a. All electronic assemblies containing printed circuit boards	
	b. Electronic components containing hazardous substances such as TVs, VCR, stereo, etc.	
4. Used oil	Spent oil such as waste oil or oil residues	No importation of tanker sludge shall be allowed; Spent oil shall have no traces of polychlorinated biphenyls (PCBs).
5. Fly-ash	Coal-fired power plant fly-ash	Coal-fired power plant fly-ash containing Annex I substances in concentrations sufficient to exhibit Annex III characteristics (note the related entry on Basel Convention list B B205) shall not be allowed for importation. Pre-treatment of the fly-ash to confirm with the requirement for clinker or cement production should be undertaken at the country of export. Any residual or wastes fly-ash which could not be used in the cement production must be shipped back immediately to the country of origin.

Source: DENR Administrative Order No. 1994-28, No. 1997-28, No. 2004-27, and No. 2004-66.

(2) Outline of Regulation

The regulation is outlined as follows:

- All importers of recyclable materials containing hazardous substances must first register with the Department of Environment and Natural Resources (DENR), through the Environmental Management Bureau (EMB).
- Importers should make application for Importation Clearance (IC) for each shipment.

Recyclable materials imported and exported by the Philippines are summarized in Table 1.3.6 and Table 1.3.7.

Table 1.3.6 Hazardous Electronic/Electrical Wastes Imported by the Philippines (2002-2005)

Waste Commodity	2002		2003		2004		2005	
	Volume	Exporter	Volume	Exporter	Volume	Exporter	Volume	Exporter
Used televisions			100 MT	Japan	1428 pcs.	Korea	66 units	Japan
Used televisions			900 units	Korea			472 pcs.	Japan
Used refrigerators							20 sets	Japan
Electronic assemblies and scrap (used television sets, used air conditioners)			510 + 30 units	Korea				

Waste Commodity	2002		2003		2004		2005	
	Volume	Exporter	Volume	Exporter	Volume	Exporter	Volume	Exporter
Electronic assemblies and scrap (used television sets, used air conditioners)			200 + 15 units	Japan				
Scrap Electronics (Used Computers with accessories)			230 sets	Hong Kong	240 sets	Korea	240 sets	Korea

Source: Environmental Management Bureau, Department of Environment and Natural Resources

Table 1.3.7 Hazardous Electronic/Electrical Wastes Exported by the Philippines (2002-2005)

Waste Commodity	2002		2003		2004		2005	
	Volume	Exporter	Volume	Exporter	Volume	Exporter	Volume	Exporter
Printing wiring board trimmings	53 MT	Singapore	82 MT	Singapore	200 MT	Japan	800 MT	Japan
Printing wiring board			360 MT	Japan				
Printing wiring board and other scraps			200 MT	Japan	200 MT	Japan	86.5 MT	Korea
Printing wiring board			382 MT	Singapore				
Electronic component scrap	1.2 MT	Singapore						
Electronic assemblies and ferrous scrap							400 MT	Japan

Source: Environmental Management Bureau, Department of Environment and Natural Resources

1.4 Activities of Relevant Government Departments and Agencies

1.4.1 National Solid Waste Management Commission (NSWMC)

National Solid Waste Management Commission (NSWMC) is established for overseeing the implementation of solid waste management plans and formulating policies to achieve the objectives of the RA9003. The activities of NSWMC are summarized below.

(1) Promotion of Purchasing Environmentally Preferable Products and Services

For encouraging national and local agencies and organizations to purchase environmentally preferable products and services, NSWMC will organize an inter-departmental technical working committee to discuss the criteria for environmentally preferable products and services.

(2) Preparation of A List of Non-Environmentally Acceptable Products

For the preparation of a list of non-environmentally acceptable (NEA) products, NSWMC will organize an inter-departmental technical working committee (TWC) for Phasing Out NEA Products and Packaging Materials. The members of the TWC are as follows:

- Government Agencies (DTI, DOST, DENR, DOH)
- NSWMC Commissioners from manufacturing and packaging sector, recycling sector, and environmental NGOs
- NGOs (Clean & Green Foundation, Ecowaste Coalition, Solid Waste Management Association of the Philippines, Zero Waste Recycling Movement of the Philippines Foundation)

The DTI and DOST serve as chair and co-chair of the TWC. The functions of TWC are as follows:

- 1) Harmonize all existing regulations on phasing out certain products or packaging materials
- 2) Formulate the criteria/guidelines for selection of NEA products and packaging materials
- 3) Create a Technical Working Group per type of products to be phased-out and define its scope of work
- 4) Tap existing agencies/member of the NSWMC to provide experts to assist formulation of the guidelines
- 5) Facilitate the scientific, environmental, technical and economic studies on the proposed NEA phase-out
- 6) Conduct public hearings and consultations
- 7) Make the list of NEA products and packaging materials to be phased out
- 8) Determine the time frame for phasing out of NEA products
- 9) Submit the final report and the list of NEA products and packaging materials to NSWMC for its consideration and adoption

The first TWG meeting on NEAP was held on July 7, 2006; the TWG on NEAP is scheduled to have a meeting on the third Friday every month. Currently they are reviewing existing policies, proposals in the Congress, and other document to identify what should be included in the list of NEAP. The National Congress is currently pushing the NSWMC to develop the list at the earliest time possible.

1.4.2 Department of Trade and Industry (DTI)

(1) Study on Markets for Recyclable Materials

DTI is required to conduct the study on existing and potential market of recyclable materials. This Study was carried to meet this requirement.

(2) Study on Product Standards for Recyclable and Recycled Materials

Bureau of Product Standard (BPS-DTI) is in charge of preparing national product standards and evaluating products' quality according to the standards. There are more than 5,200 national products standards in the Philippines, and BPS is planning to develop total of 10,000 national product standards by 2010. Those national product standards are reviewed every five years. Upon review of the existing product standards, products using recycled materials are likely to be included. So far, national products standards for recycled materials have been prepared for blended hydraulic cement with slag and recycled paper as in Table 1.4.1.

Table 1.4.1 Philippine National Standards (PNS) for Recycled Products

Product	PNS number	Adopted Year	Remark
Blended hydraulic cement with slag	PNS 69: 2005	2005	Classified as Portland blast furnace slag cement (slag content between 1% and 70 %) and slag cement (slag content at least 70%).
Paper, paperboard and pulp - bond paper, white and colored paper	PNS 70: 2005	2005	Paper made of 100% recycled fiber is classified as Grade C.

Upon review of a national product standard, a technical committee, composed of trade/industry associations, government agencies, consumer representatives, researchers and inspection agencies, is organized. After the draft national product standard is prepared, public comments are invited for two months. The collected public comments are discussed at the technical committee.

There is no specific plan to develop national product standards for recycled products; such development mainly depends on industry's needs and availability of budget.

(3) Coding System for Packaging Materials and Products

BPS is in charge of formulating and implementing a coding system for packaging materials and products to facilitate waste recycling and re-use based on ISO 14024. With the initiative of plastic industry, the coding system for plastic packaging has been prepared and authorized as the national product standard (PNS2038: 2003). The coding system classifies plastic packaging into seven groups (PET, HDPE, PVC, LDPE, PP, PS, and Other).

Preparation of the coding system follows the same procedure of the national product standard. A technical committee on coding system for carton started the discussion in September 2006.

1.4.3 All Government Departments, Offices and Agencies

Although all the government departments, offices and agencies are mandated to submit their Green Procurement Programs by October 2004, there has been no program submitted to ELPB as of August 2006. According to Clean & Green Foundation, Secretariat of ELPB, and BOI, reasons for no submission are summarized as follows:

- For executive branches of the Government, all the office supply are purchased by the Procurement Service Bureau (Department of Budget and Management) and distributed to each executive branch; only purchasing of equipment or services more than 1,000 PHP and janitorial services is under the discretion of each executive branch.
- Mandate of submitting the Green Procurement Programs is not clearly provided in EO301.

However, DENR and DOST are currently carrying out Green Procurement Programs, and BOI has a Green Procurement Policy.

1.4.4 ELPB

(1) Regular Reporting to the Office of the President

Since no government agency has submitted its Green Procurement Program, the ELPB cannot submit a regular report to the Office of the President on the performance and compliance of the government departments, offices, and agencies with the Executive Order 301.

(2) Serving as A Verifier of Environmental Soundness of Products and Services

Under the Green Choice Philippines Program, there are nine product criteria approved by the ELPB as of August 2006 including detergent, tissue paper, dry battery, PE/PP packages and containers, engine oil for automobiles printing and writing papers, fire extinguishers, and Portland cement. However, only two products (Surf and Pride) in one product category (detergent) have applied for the Green Choice Philippine logo. Clean and Green Foundation explains the reason why the number of certified products is limited as follows.

- Consumers (including government agencies) are not familiar with Green Choice Philippines; therefore the industry sector feels that having the logo does not increase their market share.
- Applying for the certification of Green Choice Philippine logo as well as putting the logo on products require some costs.

Because of the low number of applicants for the Green Choice Philippines, the program is short of financial resources to sustain its activities. Clean and Green Foundations has been allocating its own fund to the Green Choice Philippines Program, but it is getting hard to continue.

(3) Preparation of A List of All Certified Environmentally Sound Products

Because there are only two products in one category (detergent) certified to have Green Choice Philippine logo, ELPB has not developed a list of all certified environmentally sound products yet. As of August 2006, nine product criteria have been approved.

Table 1.4.2 Development of Product Criteria by Technical Working Group (TWG)

	TWG Name	Status	Remarks
1	Detergent	Criteria approved	Two products, "Pride" and "Surf," have been certified.
2	Tissue paper	Criteria approved	
3	Batteries	Criteria approved	
4	Polyethylene/polypropylene Container and packaging	Criteria approved	
5	Automobile engine oil	Criteria approved	
6	Bus transport service		(having difficulties due to conflicting interests)
7	Printing and writing paper	Criteria approved	
8	Fast food restaurants		(having difficulties)
9	Liner fluorescent lamps		
10	Writing instruments	Criteria on crayons approved in Jul. 2006	
11	Fire extinguishers	Criteria approved in Jul. 2006	
12	Air conditioners	Temporarily on hold	
13	Portland cement	Criteria approved in Jul. 2006	
14	Paints	Under preparation	
15	Digital cameras		
16	Plastic form packaging		

1.5 Current Policies and Measures

1.5.1 Economic Incentives

According to RA9003, an incentive scheme is provided to encourage LGUs, enterprises, or private entities including NGOs to develop or undertake an effective solid waste management. Incentives for the private sector to promote recycling include (1) fiscal incentives such as tax/duty exemption and tax credit, (2) non-fiscal incentives such as simplified procedures for the importation of equipment, and (3) financial assistance programs by government financial institutions such as the Development Bank of the Philippines (DBP) and Land Bank of the Philippines (LBP). Table 1.5.1 summarizes existing economic incentives.

Table 1.5.1 Summary of Existing Economic Incentives for the Implementation of RA9003

	Name of Incentive	Responsible Organization
(1) Fiscal incentives	<ul style="list-style-type: none"> ➤ Income Tax Holiday ➤ Duty Reduction on Imported Capital Equipment, Spare Parts, and Accessories ➤ Tax Credit on Raw Materials and Supplies 	BOI
(2) Non-fiscal incentives	<ul style="list-style-type: none"> ➤ Simplification of Customs Procedures ➤ Unrestricted Use of Consigned Equipment ➤ Employment of Foreign Nationals 	BOI

	Name of Incentive	Responsible Organization
(3) Financial assistance programs	➤ Environmental Lending Program	Development Bank of the Philippines (DBP)
	➤ Countryside Lending Fund	Land Bank of the Philippines (LBP)

These incentives are not introduced for the implementation of RA9003, but Income Tax Holiday, Environmental Lending Program, and Country Lending Program have sub-programs for promoting waste minimization and recycling.

(1) Fiscal Incentives

1) Income Tax Holiday

Under the 2006 Investment Priorities Plan (IPP), recycling¹ facilities can enjoy income tax holiday (ITH). The eligible facilities are those integrated with manufacturing facilities to produce semi-finished or finished products using as inputs at least 50% recyclable materials from local or domestic sources. The income tax holiday rate of exemption is calculated based on the amount of locally sourced recyclable materials used to produce a semi-finished or finished product as follows (in case the ratio of locally sourced recyclable material to the total raw material is less than 50%).

$$\% \text{ ITH rate of exemption} = \text{LSRM/TRM} * 100$$

where LSRM: locally sourced recyclable material

TRM: total raw material

When the ratio of locally sourced recyclable material to the total raw material is equal to or higher than 50%, recycling projects will be qualified for registration and 1) ITH availment in accordance with the guidelines, if for domestic markets, and 2) 100% ITH availment in accordance to export commitment, if recycled product is for export. To enjoy the income tax holiday, a firm should be registered with BOI.

2) Duty Reduction on Imported Capital Equipment, Spare Parts, and Accessories

A firm registered with BOI is entitled to the zero duty importation of capital equipment, spare parts, and accessories.

3) Tax Credit on Raw Materials and Supplies

A tax credit equivalent to the national internal revenue taxes and duties paid on raw materials,

¹ Recycling refers to the treating of used or waste (i.e. biodegradable, non-biodegradable, recyclable and special) materials through a process of making them suitable for beneficial use and for other purposes, and includes any process by which solid waste materials are transformed into new products in such a manner that the original products may lose their identity, and which may be used as raw materials for the production of other goods or services.

supplies and semi-manufacture of export products and forming part will be granted to firms registered with BOI.

(2) Non-fiscal Incentives

A firm registered with BOI may enjoy the following incentives

- Employing foreign nationals in supervisory, technical or advisory positions for five years from the date of registration.
- Applying for simplified customs procedures for importation of equipment, spare parts, raw materials and supplies and exports of processed products.
- Importing consigned equipment for a period of 10 years from the date of registration, subject to posing of a re-export bond.

(3) Financial Assistance Programs

1) Environmental Lending Program

DBP's Environmental Lending Program is established especially for providing preferable financial loans to environmental projects, which has been funded by various sources such as JBIC, World Bank, ADB, and KfW. Under the Environmental Lending Program, there is a sub-program for waste minimization and recycling; JBIC is the main funding source for projects in this category. The outline of the lending program is summarized in Table 1.5.2.

Table 1.5.2 Summary of Environmental Lending Program for Waste Minimization and Recycling by DBP

Item	Description	Remark
Year of Start	Phase I: 1996 – 2001 Phase II: 2001 – 2006	
Original Funding	JBIC and KfW	JBIC funding: 5 billion yen for Phase I and 20 billion yen for Phase II
Eligibility	<ul style="list-style-type: none"> • Private companies • LGUs • Government controlled corporations 	No limit for capital size of private companies for eligibility
Conditions	80% of total costs are financed	Interest rates are defined according to funding source (JBIC or KfW)
Advantage of Loan (compared to regular commercial loans)	<ul style="list-style-type: none"> • Longer term (12-15 years) • Fixed interest rate • Longer grace period (3-5 years) 	Commercial loan terms are usually 5-7 years, with variable interest rate (every quarter) and grace period of 3 years.
Approved Loans for Recycling	Phase I: recycling of used oil Phase II: recycling of PET bottles to PET bottles	Seven projects were approved during 2005 under "waste minimization and recycling."

During the Phase I, a loan was provided for the development of used oil recycling facility. Since the owner of the facility could not collect enough used oil domestically, it planned to import used oil from other countries. However, used oil was categorized as hazardous waste, whose import was prohibited by RA6969. Therefore, the DENR DAO 28 was issued to allow import of used oil except for tanker sludge if it does not show any trace of PCBs.

20 billion yen for waste minimization and recycling projects provided by JBIC was all availed during Phase II while only one project had a recycling component. The project was proposed by a private beverage company and included the establishment of a PET bottles recycling facility. According to DBP staffs, the beverage company was collecting virgin PET bottles, but the quantity was not enough to economically run the facility. Therefore, it has started a campaign to collect PET bottles by asking school children to bring their used PET bottles in exchange for goods; if the collected volume reaches a certain target, necessary equipments to schools such as TVs are also provided by the company.

DBP considers that the key to survival of recycling industry is securing recyclable materials with the quantity sufficient to run recycling facilities. It also pointed out necessity of establishing a social infrastructure for collection of recyclable materials such as segregation of waste at source and deposit system for packages and containers.

2) Countryside Loan Fund

LBP's Countryside Loan Fund (CLF) is a wholesale credit facility to provide preferable financial loans to SMEs (small and medium enterprises), which has been funded by the World Bank. Investments in recycling activities may fall within the eligible projects under the CLF as environmental protection projects (wastewater treatment facility, bio-gas collection, etc.) and manufacturing activities that generate employment/export. The outline of the CLF is summarized in Table 1.5.3.

Table 1.5.3 Summary of Countryside Loan Fund by LBP

Item	Description	Remark
Year of Start	Phase I: 1992 – 1996 Phase II: 1996 – 1999 Phase III: 1999 –	
Original Funding	World Bank	
Eligibility	<p><Direct Borrower></p> <ul style="list-style-type: none"> • Commercial banks • Rural banks • Thrift banks (stock savings & loan associations, saving & mortgage banks, private development banks) • Non-bank financial institutions (leasing/financing companies) <p><Sub-borrower></p> <ul style="list-style-type: none"> • Sole proprietorship • Partnership 	<p>For sub-borrowers, SME whose capital size is equal or less than 1 million pesos is eligible.</p> <p>Eligible projects located in Cebu City and NCR should be engaged in agriculture and agri-related activities.</p> <p>During 2005, loans have been accredited to 38 banks (15 commercial, 9 rural, 9 thrift, and 5 non-banks).</p>

Item	Description	Remark
	<ul style="list-style-type: none"> Corporation (at least 70% Filipino-owned) Cooperative/Association 	
Conditions	75% of total costs are financed	
Advantage of Loan (compared to regular commercial loans)	<ul style="list-style-type: none"> Longer term (12-15 years) Fixed interest rate 	CLF's grace period is 2 years, which is shorter than commercial loans.
Approved Loans for Recycling	<ul style="list-style-type: none"> Bio-gas collection at a piggery in Tarlac Production of handicraft from waste coconuts Glass cullet recycling at a bottle manufacturing company in Laguna Power generation from bagasse at a sugar mill in Pampanga 	

Up to present, 2,333 projects under the CLF were funded with 25.56 billion PHP.

1.6 Other Recycling Initiatives by Relevant Stakeholders

1.6.1 Metro Manila

Table 1.6.1 summarizes financial situation of SWM in LGUs of the Metro Manila (Year 2001). Unit cost per capita varied widely from 64 PhP to 1,164 PhP. This disparity may come from the difference in operation system of SWM in each LGU.

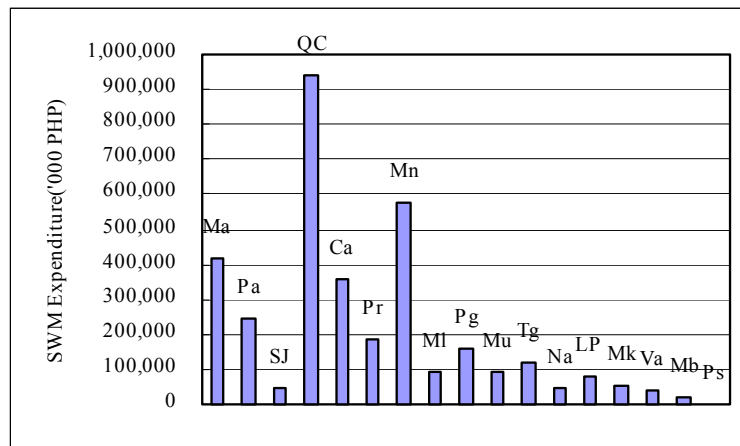


Figure 1.6.1 SWM Expenditure of LGUs of Metro Manila

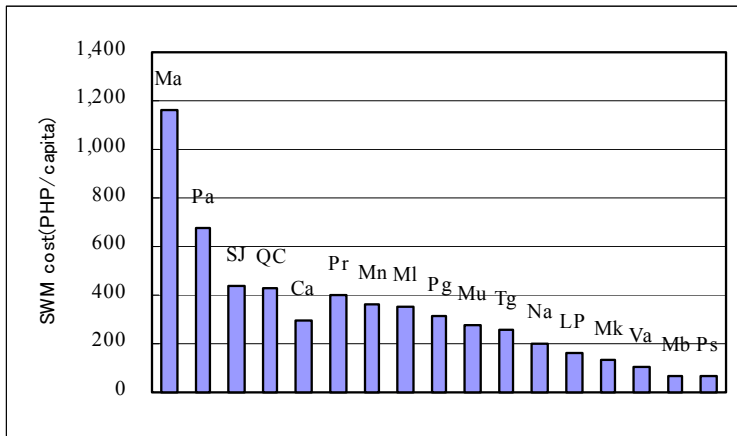


Figure 1.6.2 SWM Expenditure of per capita LGUs of Metro Manila

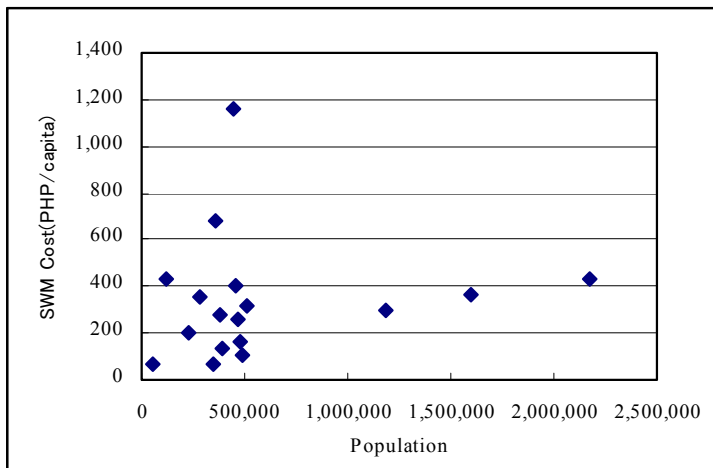


Figure 1.6.3 Relationship between population and SWM expenditure per capita

Table 1.6.1 Table 1 Data on SWM management in the LGUS of Metro Manila in 2001

LGU	Population	Calculated Amount of Waste		Total Expenditure 1,000PhP	SWM Expenditure 1,000PhP	Waste fee 1,000PhP	SWM cost Per capita PhP/capita	SWM cost Per ton of waste PhP/ton	SWM cost recovery %
		Ton	1,000PhP						
Makati	449,583	76,141	734,606	418,577	13,835	1,164	5,497	3.31	
Pasay	358,670	75,390	778,475	243,807	5,473	680	3,211	2.24	
San Juan	118,927	22,659	1,129,801	46,701	3,137	436	2,061	6.72	
Quezon City	2,168,874	465,078	1,358,644	941,828	56,017	429	2,025	5.95	
Caloocan	1,190,087	251,941	1,491,833	357,077	20,714	300	1,417	5.80	
Paranaque	454,579	96,234	62,186	182,893	3,114	402	1,900	1.70	
Manila	1,597,841	338,263	4,558,818	574,990	57,589	360	1,700	10.02	
Mandaluyong	281,426	56,599	5,270,998	94,123	7,247	352	1,663	7.70	
Pasig	510,412	108,054	348,800	160,458	11,414	314	1,485	7.11	
Muntinlupa	383,331	68,978	1,059,651	91,377	7,012	280	1,325	7.67	
Tagig	472,329	99,952	1,814,072	120,949	4,040	256	1,210	3.34	
Navotas	232,845	46,829	432,394	43,974	1,850	199	939	4.21	
Las Pinas	477,791	101,148	4,467,316	76,360	12,820	160	755	16.79	
Marikina	395,316	83,688	850,099	52,804	7,093	134	631	13.43	
Valenzuela	490,579	83,084	292,836	42,716	10,427	109	514	24.41	
Malabon	342,447	72,496	1,219,353	22,067	3,777	64	304	17.12	
Patetos	58,016	9,826	430,373	2,988	406	64	304	13.59	
Sum/Average	10,011,053	2,056,360	26,300,255	3,473,689	225,965	347	1,689	6.51	

Source: Metro Manila Solid Waste Management Project (DENR, ADB September 2003)

The amount of solid waste given in the previous tables is estimated as follows:

$$\text{Amount of solid waste generated} = 0.58\text{kg/capita/day} \times \text{population} \times 365 \text{ days/year}$$

Waste fee represent the income from collection of fees from commercial entities and factories. The fee collected from household is not included since only limited LGUs collect the waste fee from the household.

Table 1.6.2 below shows the current system of solid waste collection and disposal in the LGUs. In the year 2001, twelve LGUs out of 17 contract out SWM services to private sector. The Quezon City, which contracts out SWM to 5 private companies, spend about 95 % of the City's total SWM budget. The amount of private contract for SWM occupies a big part of SWM in LGUs.

Table 1.6.2 Current Solid waste collection and disposal system of LGUs in the Metro Manila

	Collection system	Collection Coverage (%)	Own disposal site	Disposal location
Makati	Contract	80	No	Rodriguez
Pasay	Contract		No	Rodriguez
San Juan	Contract	90	No	Rodriguez
Quezon City	Contract		Yes	Payatas
Caloocan	Contract		No	Rodriguez, Sta Maria
Paranaque	Contract		No	San Pedro, Laguna
Manila	Contract	100	No	Rodriguez
Mandaluyong	Contract	95	No	Rodriguez
Pasig	Contract	100	No	Rodriguez, Taytay, Payatas
Muntinlupa	Contract	85	No	Rodriguez, San Pedro
Tagig	Contract		No	Rodriguez
Navotas	Contract	95	No	Tanza, Navotas
Las Pinas	Direct		No	Pulang Lupa
Marikina	Direct		Yes	Dona Petra, Rodriguez
Valenzuela	Direct	80	Yes	Lingunan
Malabon	Direct		Yes	Calmon
Pateros	Contract /MMDA		No	Rodriguez

Note: Rodriguez and Tanza disposal sites are owned and operated by MMDA

Source: Metro Manila Solid Waste Management Project (DENR, ADB September 2003)

1.6.2 Marikina City

Marikina City, located in the east part of Metro Manila, has population of 450 thousand and generates approximately 250 tons municipal solid waste per day. The city administration operates the collection of the solid waste directly. With the waste segregation policy "No segregation no collection," the city first started segregation of solid waste at household level in the Metro Manila. Each household is required to segregate the waste into biodegradable and non-biodegradable and put them into the bangs with different colors of ribbon. The percentage of biodegradable in the total waste generation is about 45 %. The collected non-biodegradable waste is transported to the MRF operated by the city administration. The current diversion rate of the recyclable waste is approximately 30 %. The main SWM programs in Marikina City are as follows:

- Operation of MRF and recovery of recyclable waste from non-biodegradable waste
- ECO Saver Program (school based recycling program)
- Segregation of waste tire and utilization in the cement kiln as the fuel substitution
- Segregation of waste coconut husk and garden waste and utilization in the paper mill as the fuel substitution
- Recycling of demolition and construction waste as backfilling materials
- Operation of Buyback center

Total budget of Marikina city was approximately 1.1 billion PhP, of which SWM budget was 82 million PhP in 2005. On the other hand, the actual cost for SW collection including street sweeping and sanitary education was 80 million PhP while final disposal cost was 32 million PhP. The SWM cost per capita was 120 PHP that is nearly equal with the ADB survey data (134 PhP). The revenue from waste fee collection was totally about 23.8 million PHP, of which 13 million PHP from business entities while the remaining about 10 million PHP from household. The revenue only covers about 32% of the actual cost spent for SWM.

Table 1.6.3 SWM Budget in Marikina City (2000-2006)
(Unit; 1,000 PhP)

Year	Allocated budget	Disbursed
2000	66,175	59,668
2001	71,248	52,804
2002	47,030	48,875
2003	57,609	53,789
2004	70,890	60,693
2005	82,029	75,238

Source: Marikina City

Table 1.6.4 Breakdown of revenue of waste management in Marikina city
(Unit; 1,000 PhP)

Year	2004	2005
Waste management fee		
Commercial facility	13,170	12,887
Residential facility	11,794	9,637
Revenue from operation of MRF	900	900
Special trips	88	182
Penalty	68	209
Total	26,012	23,815

Source: Marikina City

1.6.3 Quezon City

Quezon City, the biggest LGU in the Metro Manila, has population of about 2.3 million with 142 barangays. The city generates around 1,500 tons of municipal solid waste per day, which is disposed at Payatas final disposal landfill located within the city. The collection and disposal of

solid waste operation are subcontracted to five private companies.

The table below illustrates the budget of Environmental Protection and Waste Management Department, which is in charge of SWM in Quezon City, in the fiscal year of 2006.

The total cost spent is 880 million PHP, of which the subcontract of the collection and disposal occupies 95.2%. Maintenance cost of heavy equipment such as bulldozers and trucks is 35.6 million PHP or 4% of the total cost. Per capita SWM cost is about 385 PHP.

The city does not collect the waste fee from household while the waste fee from the business entities are collected, which accounts for around 50 million PHP, only covering 5% of total SWM cost.

Table 1.6.5 Budget of fiscal year 2006 of Environmental protection and waste management department of Quezon City

Items	Allocated Budget x 1,000 PhP	Ratio	Remark
1. Operation cost(A+B)	879,864	99.9	
A. Labor cost	5,464	0.6	
Basic wage	3,928	0.5	
Other wages	1,536	0.1	Bonus etc
B. Maintenance and other expenditure	874,400	99.3	
Goods and materials	750	0.1	
Communication	50		
Service	838,000	95.2	Waste collection and disposal fee etc
Maintenance and repair	35,600	4.0	Vehicle maintenance etc
2. Land, plant, equipment	650	0.1	Investment cost
Sum (1+2)	880,514	100.0	

Source: Quezon City

1.6.4 R & D of Relevant Technologies

(1) PET-to-PET recycling

San Miguel Packaging Specialist (SMPS), an affiliate company of the Philippines's beverage giant -- San Miguel Corporation, is one of the major manufacturers of PET bottles in the Philippines. SMPS are producing approximately 500 million PET bottles each year at their 3 plants, including San Fernando plant in Pampanga province where construction of a PET-to-PET recycling plant is underway. According to SMPS, the full-scale operation was expected to be started by December 2006, however, it is still under test run in 2008. Capacity of this recycling plant will be 500kg/h (or 3.8 thousand ton/year) in the 1st stage and the capacity in the second stage is expected to be 1,000kg/h (or 7.6 thousand ton/yr). Target input ratio of recycled PET flake as raw material is 30%. The plant utilizes PET-to-PET recycling technology from the United Resource Recovery Corporation, US (URRC). San Miguel Packaging Specialist believes that the project will have the following benefits.

Table 1.6.6 Expected Benefits of PET-to-PET recycling

Beneficiary	Benefits
The company	● Saving US\$ 9 millions of import cost of raw material (PET) in 10 years
	● Saving 500 million of PHP of domestic purchase cost of raw material (PET) in 10 years
	● Creating additional employment of 400 workers
LGU	● Reducing collection cost of municipal solid waste
	● Reducing the amount of final disposal of solid waste

The initial investment cost of the project is 500 million PHP. SMPS raised the fund through utilization of the investment incentive available in BOI and soft loan from DBP. It also plans to accumulate the operation know-how for exporting the plant itself to ASEAN countries in the future. The recycling process applied in this plant is called “Hyper-Cleaning Method”, developed by United Re Source Recovery Corporation. The figure below illustrates the process of Hyper Cleaning Method.

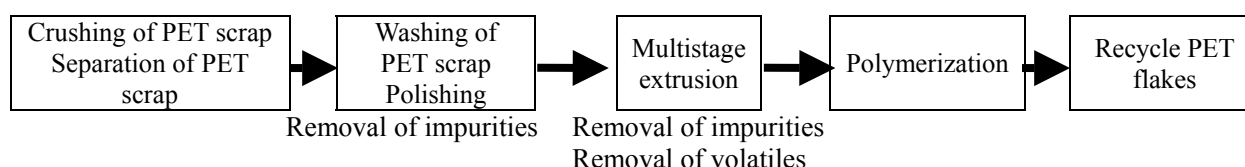


Figure 1.6.4 PET-to-PET Recycling (Hyper-cleaning method)

URRC had been carrying out the research and development of PET-to-PET recycling technology (UnPET Technology) since 1996. This UnPET Technology has already obtained so-called “No Objection Letter (NOL)”, which is required for all the products to have direct contact with food, from the Food and Drug Administration (FDA) of the United States in February 2002. By utilizing the recycle PET resin produced from this UnPET Technology, the cost of PET bottle production will be saved at the rate of 20 to 30%, comparing with the use of virgin PET resin.

(2) Technology Development

Industrial Technology Development Institute (ITDI) of the Department of Science and Technology (DOST) has been developing the waste recycling technology.

1) Recycling of aluminum laminated film packaging wastes (composite)

Aluminum laminated film packaging of Doypack juice has four layers (first layer: transparent PET film, second layer: LDPE film, third layer; aluminum, fourth layer; transparent PET film). The plastic is 89% by weight while aluminum foil is 11%. It is difficult to separate the PET, LDPE and aluminum foil for recycling.

Some NGOs like Kababaihan Iisa Ang Layunin Umunlad Ang Sambayanan (KILUS) collect the aluminum laminated film packaging for recycling. The collected packages are washed, dried, and sewed to make sandals and shopping bags.

On the other hand, ITDI, in cooperation with Nestle Philippines, had developed a technology to recycle this aluminum laminated film packaging. Approximately five tons of such wastes are said to be generated in one month from instant coffee and cream packs. The wastes are mixed with polyethylene resin after crushing, and then molded to make plastic products like pails. The capacity of the crusher is 40-50kg/h. The technology is still development stage, but ITDI is hoping to commercialize this technology.



Figure 1.6.5 Recycle of Aluminum Laminated Film Packaging

2) Recycling of Styrofoam wastes

ITDI developed a technology of recycling of Styrofoam wastes such as food trays. The food trays are cut finely, then waste food oil and cement based solidification agent are mixed. It produces lightweight block, tiles, brick and board. It is said that two LGUs adopted this machine to reduce the Styrofoam wastes.

Table 1.6.7 Cost of Lightweight Block Production from Styrofoam Waste

Capacity	4.9ton/day
Investment cost	107,086 PhP
Production cost	9.57 PhP/kg
Selling price	15.0 PhP/kg

3) Others

Palingenesis Manufacturing Inc. of Muntinlupa city has developed a technology for making construction materials from solid wastes. They also sell the commercialized equipment. In their process, biodegradable wastes are removed from solid wastes and crushed. Then sand, cement,

lime are added to produce the construction materials like lightweight blocks, panels and culvert. Commercialized plant utilizing this technology has not been realized in the Philippines, but a plant is being constructed in Russia. Moreover, Swiss based cement major HOLCIM Bulacan plant has began to accept industrial waste as the substitute of raw material of cement and fuel of kiln.

1.6.5 Private Sector and Local Government (Industries, NGOs, LGU)

(1) The Philippine Business for the Environment (PBE)

The Philippine Business for the Environment is a NGO established in 1992 for the purpose of supporting the Philippines industries to address environmental issues. PBE's activities include;

- Information service, issuance of "Business and Environment" quarterly
- Advocacy advertising and education
- Promotion of cleaner production and environmental technologies
- Establishing cooperation among relevant organizations, industries and so on

1) Recyclable Collection Event (RCE)

Recyclable Collection Event (RCE) organized by LGU, private company, or individual people have become very frequent in recent years, especially on or around Earth Day in April. PBE plays as a coordinator of some of these RCEs held by LGU in Metro Manila and/or Calabarzon area. In RCE, recyclers and end-users of recyclable wastes set up booths to purchase and/or accept recyclable wastes that local residents, commercial shops, and small factories bring in. The recyclables collected include waste paper, waste home electrical appliances.

According to the "Business and Environment (second quarter 2006)", most of RCEs in 2006 were successful with a lot of participation from recyclers and end-users. Following Table 1.6.8 shows the amount and value of recyclable wastes collected in the RCE coordinated by PBE between 2002 and 2006. PBE had advertised that unaccepted recyclables waste by junkshops, such as black-and-white TVs and mobile phones, could be brought in to the event for recycling, although mobile phones are rarely collected.

Table 1.6.8 Amount and Value of Recyclable Wastes Collected in Recyclable Collection Event

Recyclable wastes	Unit	Amount (2002-2005)	Amount (2006)	Sum
Waste paper	kg	58,661	25,378.3	84,039.3
Car battery	pcs	10,119	410	10,529
Personal Computer	pcs	3,426	824.2	4,250.2
Aluminum can	kg	919	169	1,088
PET bottle	kg	1,520.5	1,123.2	2,643.7
Waste plastics other than PET	kg	560	773.5	1333.5
Toner/Ink cartridge	pcs	1,593	1,426	3,019
Tire	pcs	543	93	636
Glass bottle	kg	173.5	588	761.5
Iron/steel scrap	kg	108	—	108

Recyclable wastes	Unit	Amount (2002-2005)	Amount (2006)	Sum
Scrap alloy	kg	2	-	2
Paint can (tin plate)	pcs	90	-	90
Tin can (tin plate)	kg		256.4	256.4
Scrap metal	kg		612.5	612.5
Amount of money	PhP	1,434,778	386,909	1,821,687

Source: Business and Environment, Second quarter 2006

2) Industrial Waste Exchange Program

Industrial Waste Exchange Program (IWEP) was launched in 1987 by DENR, and currently run by PBE. Waste generators and buyers who wish to participate in the program are required to register the following information.

- Contact information (Company name and address, etc)
- Types of waste (Acid, alkali, metal, sludge, waste paper, wood, solvent, and other organic chemicals, etc.)
- Amount of waste and its physical aspect (liquid, slurry, solid, etc.)
- Waste generating Process

If the waste generators and buyers agree, above information will be shown in the “*Business and Environment*” for searching possible waste exchangers. When inquiries from companies or an individual come to PBE, PBE coordinate the exchange. Currently 130 companies/buyers and more than one thousand waste items are registered in the IWEP database. However, since the Philippine is composed of many islands, according to PBE, there are many cases that transportation cost prohibited from waste exchange to realize.

1.6.6 Metro Manila Federation of Environment Multi-Purpose Cooperative (MMFEMPC, LINIS- GANDA)

Metro Manila Federation of Environment Multi-Purpose Cooperative (MMFEMPC), commonly called LINIS-GANDA, is an organization of junkshops of the recyclable waste. The federation has formed in Quezon City and currently has branches in 17 LGUs in Metro Manila as well as Cavite province and Mindanao area. The number of member junkshops is approximately five hundred, and total sales are reported to 300 million PhP.²

Figure 1.6.6 illustrates simplified flow of recyclable waste of LINIS-GANDA. First, waste collector, or Eco-Aide, purchases and collect the wastes from households, shops and small factories. Then, Eco-Aide transports the wastes to a junkshop. The money necessary for Eco-Aide to purchase the waste is lent by the junkshop. There are approximately 1,200 Eco-Aides whose earnings are 200-300 PhP per day.

² Business and Environment (Fourth Quarter 2004)

The junkshops store the recyclables and sell them to dealers when its volume reached enough. Smaller junkshops sell the recyclables to medium and large junkshops.

There are many types of dealers, for example, the dealer handling specific wastes like waste paper and metal scraps, or the dealer handling many kinds of recyclable waste. There are also cases that the junkshops sell the waste paper to the paper mills directly.

The Junk shops under LINIS-GANDA normalize the purchasing price of the wastes. LINIS-GANDA holds a regular meeting, normally twice a month, with its members and LGUs to consult various matters including their activities and buying prices. In the meantime, the junkshops can determine the selling price depending on the market price, business relation to the dealers and so on.

LINIS-GANDA is a cooperative whose operating financial source are loans from Landbank, Country Development Fund, and repayment from the member junkshops. When a junkshops wishes to become a member of LINIS-GANDA, the shop has to pay entry fee of 100 PhP. When a member junkshop wish to make a bridge finance of, for instance, 50 thousand PhP, they need to purchase the capital of LINIS-GANDA of 15 thousand PhP. In case of bridge finance of 100 thousand PhP, they need to buy the capital equivalent with 30 thousand PhP.

Table 1.6.9 shows the recyclable waste purchased by LINIS-GANDA in 2005. LINIS-GANDA collected 220 thousand tons of the recyclable wastes in the Metro Manila. The waste paper and cardboard made up 58.5% and bottles occupied 7.8%, waste plastics 11.85 and metal scrap 22.0%

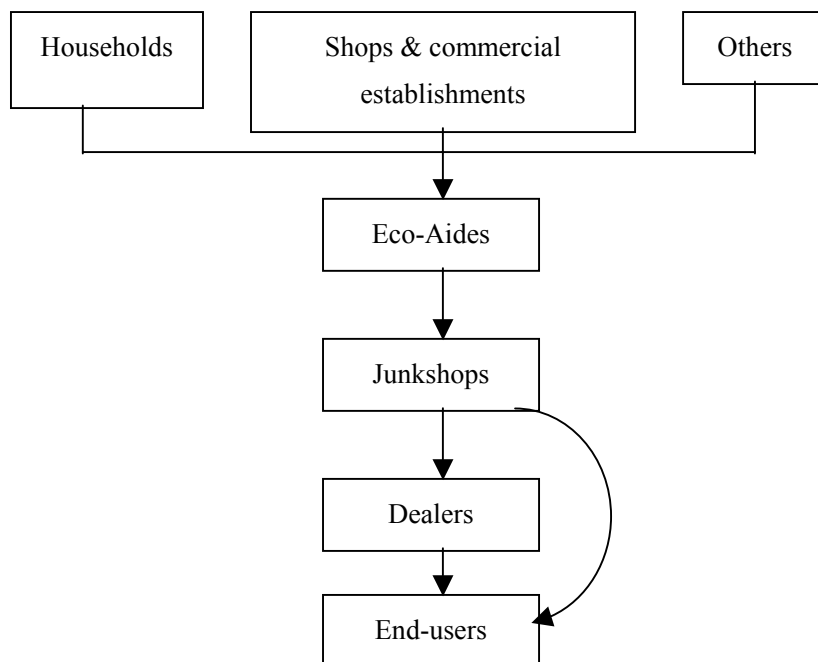


Figure 1.6.6 Flow of recyclable wastes collected by LINIS - GANDA

Table 1.6.9 Amount of Recyclable Wastes in Metro Manila Purchased by Linis Ganda (2005)

Recyclable wastes	Amount (MT)	Ratio (%)	Price (PhP/kg)	Value (PhP)	Ratio (%)
Old newspaper	35,868.19	16.3	2.0	71,736,380	25.5
Waste paper	34,273.44	15.6	0.5	17,136,720	6.1
Carton	58,622.31	26.6	1.0	58,622,310	20.9
Whole and broken bottles	17,259.39	7.8	0.5	8,629,656	3.1
Plastics	25,921.12	11.8	2.0	51,842,240	18.4
Iron scrap, Drum can, Tin plate and can, Aluminum can	48,585.29	22.0	1.5	72,877,935	25.9
Total	220,529.74	100.0		280,845,280	

Source: MMDA

1.6.7 Zero Waste Recycling Movement (ZWRM)

Zero Waste Recycling Movement (ZWRM) is a NGO which has practices waste management activities under the concept of ecological solid waste management. They are providing training courses, advocacy and consulting in the solid waste management based on the memorandum with DENR that established the Ecological Solid Waste Management Law (RA9003). The training courses include;

- Basic course of ecological solid waste management
- Construction of material recycling facility (MRF)
- Final disposal of wastes, etc.

Trainees are LGU staffs, barangay residents, students and recyclers. They provide consulting not only on solid wastes but also medical and industrial wastes management. In Cebu and Mindanao, they are operating waste exchange program in cooperation with local NGOs.

1.6.8 Donors

Major donor projects in terms of waste management and 3Rs are summarized in Table 1.6.10.

Table 1.6.10 Major Donor Projects in terms of Waste Management and 3Rs

Project	Donors	C/P	Summary of project	Period	Budget
Metro Manila Solid Waste Management Project (MMSWP)	ADB	DENR	<p>Comprehensive waste management project in Metro Manila</p> <p>Key components are as follows:</p> <ul style="list-style-type: none"> ● RA 9003 capacity building including LGU Plan development, assistance, waste characterization assessments, funding of pilot, CBSWM projects, formulation of model CBSWM guidelines; ● Medical waste sector review, training, IEC, technology assessment, formulation of a sector-wide improvement strategy ● RA 9003 national agency support including institutional capacity building, media outreach and website initiatives; ● Waste disposal assistance including sector review, formulating short-term improvements, assisting in longer-term planning, and Providing coordination and advice. 	2002-03	1.5 million US\$ TA
Community Based Ecological Solid Waste Management Project (CBESWMP)	UNDP JICA	MMDA	<p>Three-year community based technical assistance project to promote CBSWM in at least 10 Metro Manila pilot barangays, including:</p> <ul style="list-style-type: none"> ● Establishment of CBSWM infrastructure, mechanisms and institutional arrangements; ● Implementation capacity building and IEC ● Formulation of CBSWM guidelines and templates for replication. 	2002-05	0.3 million US\$ TA
Ecological Solid Waste Management Plans (ESWMP)	JBIC	DENR	<p>Formulation of the ecological solid waste management plan</p> <p>Plans for Munoz City, Legaspi City and Butuan.</p>	2002-03	TA
Local Government Support Program (LGSP)	CIDA	DILG NEDA	<p>Technical assistance for over 200 LGUs in seven regions of the Visayas, Mindanao and ARMM to build capacity and implement development projects.</p>	1999-2005	20 Million TA
Philippine Environmental Governance Project (ECOGOV)	USAID	DENR	<p>Three-Year LGU demand-driven program to improve environmental governance. Resources are focused in Mindanao (50 percent), the Visayas (35 percent) and Northern Luzon (15 percent).</p>	2001-04	15 Million US\$ TA
Philippines Regional Municipal Development Project (PRMDP)	ADB Gov. Australia	DILG	<p>Joint ADB and Australia municipal infrastructure development project for six provincial cities. Includes the provision sanitary landfill facilities for Puerto Princesa and Tagbilaran, equipment for Puerto Princesa and General Santos, institutional development programs and development of systems and manuals.</p>	1998-2003	30 Million US\$ Loan
Solid Waste Ecological Enhancement Project (SWEEP)	World Bank	DENR	<p>Project preparatory technical assistance to formulate a US\$ 55 million loan package for solid waste management improvements for seven selected LGUs in intermediate cities.</p>	1998-2000	1.5 Million US\$
Pasig River Environmental Management and Rehabilitation (PRRC)	ADB DANIDA	PRRC DENR	<p>Major environmental improvement programs for the Pasig River system funded by DANIDA and later by ADB, and both included technical assistance to improve solid waste management within riverside communities and provide support to CBSWM.</p>	1994-2003	TA

Note: TA: technical assistance

Source: Metro Manila Solid Waste Management Project 2003 ADB-DENR

2. Current Recycling Activities in the Philippines

2.1 Survey Outline and Methodology

In general, the survey was carried out with the main objective to identify the material flow of recyclable materials in the Philippines, by targeting 3 selected major towns in the country as survey sites, namely Metro Manila, Metro Cebu and Metro Davao.

Three regional workshops inviting various recycling stakeholders were held at these towns, mainly to seek for opinions and cooperation from the stakeholders in the surveys carried out. The workshops were organized scheduled as follows:

- 1) Metro Manila – on 28th July 2006 at Forbes Tower, Manila
- 2) Metro Cebu – on 25th August 2006 at Montebello Hotel, Cebu
- 3) Metro Davao – on 28th August 2006 at Marco Polo Hotel, Davao

The workshops were successfully held and valuable information on the current recycling practices in the Philippines was obtained.



Figure 2.1.1 Regional Workshops Held at Manila, Cebu and Davao

The information obtained shows that the current practice of recycling activities in the Philippines is following the general flow as summarized in Figure 2.1.2 below:

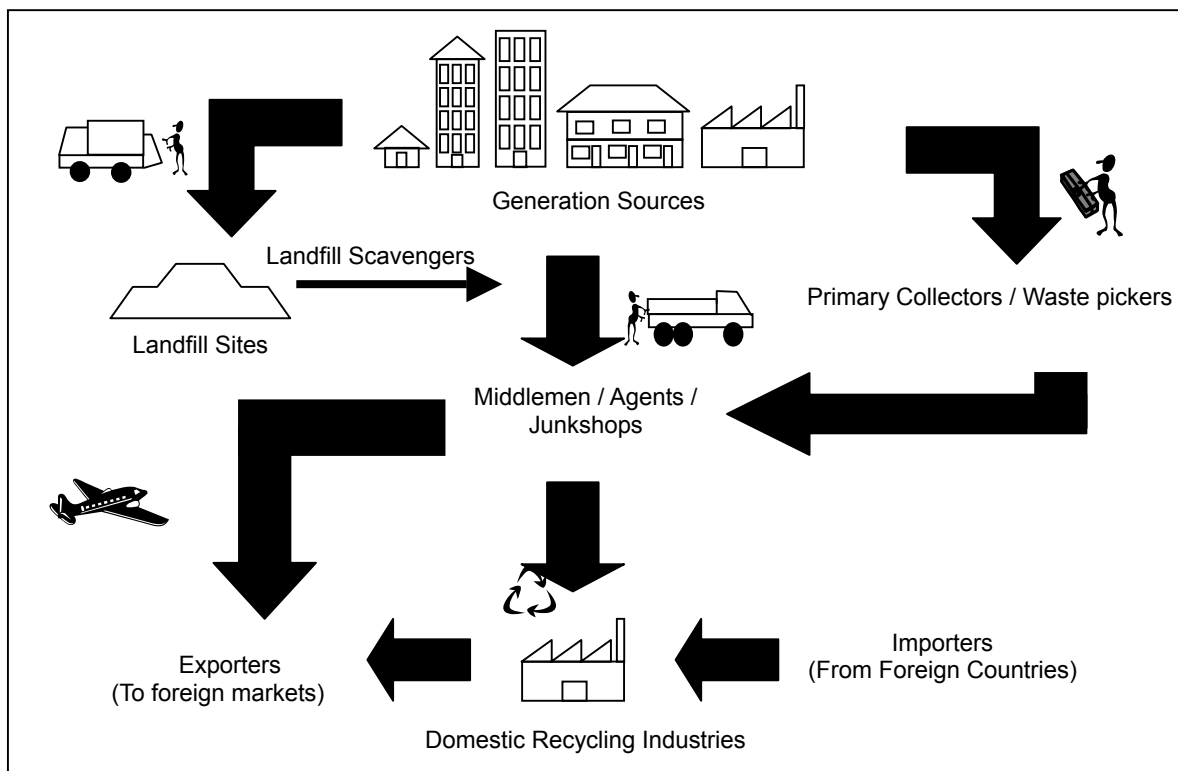


Figure 2.1.2 Current Practice of the Recycling Activities in the Philippines

Based on the current practice of recycling activities in the Philippines, survey method was designed for the study to carry out field surveys for identifying the existing material flow of recyclable materials in the Philippines, targeting on 2 categories, i.e.:

Category I:	Plastics, glass, papers, metals (iron and Aluminum)
Category II:	Cell phone battery, televisions, personal computers, refrigerators

A set of 9 questionnaires were prepared by JST with the inputs from BOI and Steering Committee Members to survey the recycling players identified in the study as discussed earlier, namely:

- 1) Q-A: Households
- 2) Q-B: BE and Institutions
- 3) Q-C: Primary Collectors
- 4) Q-D: Middlemen/agents
- 5) Q-E: RR Centre
- 6) Q-F (a): Recycling industries
- 7) Q-F (b): Recycling industries (E-wastes)
- 8) Q-G: Importer-Exporter
- 9) Q-H: E-Shops

The surveys were carried by face-to-face interview as well as some minimal number of surveys through mails (only for the 16 regions). The overall methodology flow of the survey is summarized in Figure 2.1.3 below.

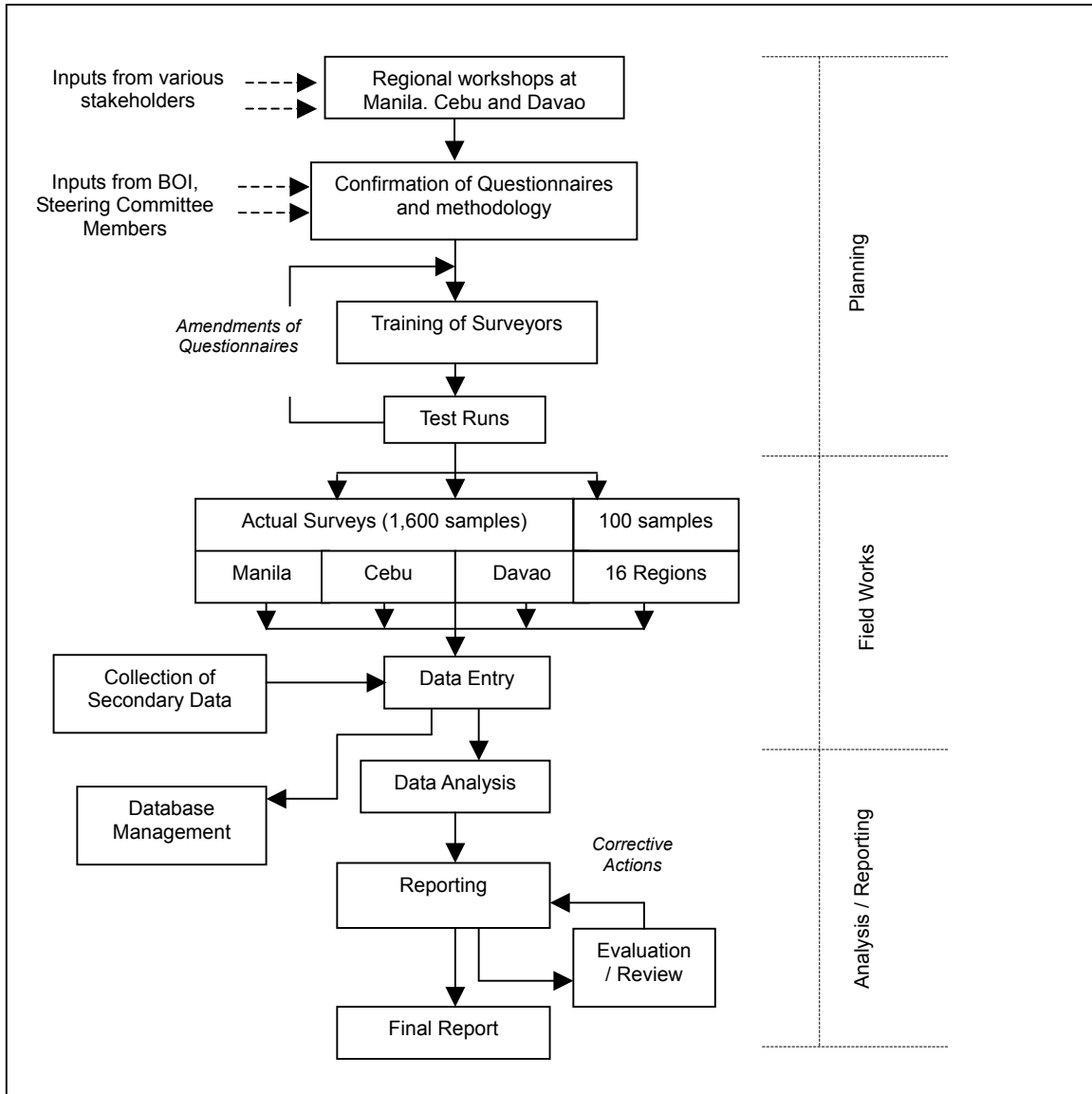


Figure 2.1.3 Summary of Overall Survey Methodology

As elaborated in the methodology, training sessions were carried out to brief selected qualified surveyors at respective area, particularly to familiarize with the questionnaires to assure effective and smooth surveys.



Figure 2.1.4 Training Session for the Surveyors



Figure 2.1.5 Actual Survey in Progress

Few rounds of test runs of the questionnaire survey were carried out prior to the actual surveys at all places. The improved questionnaires from test runs were used for the entire actual surveys which lead to the major findings of this study particularly on material flow of recyclable materials at micro scale.

In addition to the interview surveys, secondary data was also collected from various sources such as import and export data from Department of Statistics, directories of recyclers from various industrial associations and business chambers, etc. The data collected will be analyzed as well as compiled to be database for recycling in the Philippines.

The findings of the surveys were presented and described in detailed in following sections on Material Flow of Recyclables in the Philippines at Micro Scale.

2.2 Survey on Recycling Stakeholders

2.2.1 Selection of the Samples

The surveys in the study were carried out at two stages, first was the surveys carried out targeting at organizations such as business chambers, industrial associations and other institutions; while second survey was targeting at the recycling players or other relevant stakeholders.

The targets for both the surveys carried out at organizations and stakeholders were based on the information obtained from various sources in the Philippines including information provided by the Board of Investment of the Department of Trade and Industry (DTI-BOI), Environmental Management Bureau (EMB), National Solid Waste Management Commissions (NSWMC) as well as the Local Consultants.

2.2.2 Surveys on Organizations

Surveys on organizations including some private companies were carried out mainly to relevant government agencies, industrial associations as well as some major industries in order to obtain information about existing activities of each particular industry in the Philippines. The information provided was used to determine the flow of recyclable material at macro scale, such as statistics on imports and exports of materials and products, etc. The list of organizations visited and information obtained is summarized in Table 2.2.1 below while the detailed contact information is attached in the database.

Table 2.2.1 List of Organizations Visited and Information Obtained

No	Organizations	Information Obtained
<i>1) Organizations</i>		
1	National Solid Waste Management Commission (NSWMC)	<ul style="list-style-type: none"> ✓ Overall information on SWM in the Philippines ✓ List of recyclers ✓ Contact information of some relevant stakeholders ✓ Annual Report (2004) published by NSWMC
2	Environmental Management Bureau (EMB)	<ul style="list-style-type: none"> ✓ List of treaters, importers and exporters for hazardous wastes
3	Philippines Metalcasting Association, Inc. (PMAI)	<ul style="list-style-type: none"> ✓ General information about PMAI, its roles and main activities ✓ Directories of metal casting industries ✓ Existing system, problems faced and future challenges of metal casting industries in the Philippines
4	Tin Can Makers Association of the Philippines (TCMAPI)	<ul style="list-style-type: none"> ✓ Outline of the organization and the activities ✓ Detailed information on the tin can industries in the Philippines ✓ Current status of the recycling of tin and metals in the Philippines ✓ Rough estimation on the material flow of tin and tin scrap in the Philippines

No	Organizations	Information Obtained
5	Packaging Institute of the Philippines (PIP)	<ul style="list-style-type: none"> ✓ Main role and activities of PIP and PPCP ✓ Detailed information on the plastic industries and recycling of plastics in the Philippines
6	Polystyrene Packaging Council of the Philippines (PPCP)	<ul style="list-style-type: none"> ✓ Contact information of some major plastic recycling industries in the Philippines ✓ Arranged visits to selected plastic recycling industries in Valenzuela and Laguna cities
7	Metro Manila Development Authority (MMDA)	<ul style="list-style-type: none"> ✓ Background and general information on solid waste management in Metro Manila ✓ Statistics of waste generation by LGUs in Metro Manila
8	Marikina City Office	<ul style="list-style-type: none"> ✓ Detailed information on solid waste management and recycling in Marikina City including their activities, policies, financial information (revenue and expenditures)
9	Metal Industry Research and Development Center (MIRDC)	<ul style="list-style-type: none"> ✓ Background information of MIRDC including their activities and research plan ✓ Information on the current situation of Aluminum recycling in the Philippines
10	Pulp and Paper Manufacturers Association of the Philippines (PULPAPEL)	<ul style="list-style-type: none"> ✓ Information on the prices of recycled paper in the Philippines, production costs of paper manufacturing and classification of paper under PSCC codes
11	Quezon City Office	<ul style="list-style-type: none"> ✓ Detailed information on solid waste management and recycling in Quezon City ✓ Detailed financial statement of Quezon City ✓ Detailed statistics on the waste generation, recyclables collected and list of recycle players in Quezon City
12	Barangay Holy Spirit Office, Quezon City	<ul style="list-style-type: none"> ✓ Detailed information on solid waste management and recycling in Barangay Holy Spirit ✓ Statistics on prices of recyclables and total quantity of recyclables collected in Barangay Holy Spirit
13	Barangay Luz Office, Cebu City	<ul style="list-style-type: none"> ✓ Background and general information about the barangay ✓ Information on solid waste management and recycling activities carried out at barangay level
14	Zero Waste Recycling Movement (ZWRM)	<ul style="list-style-type: none"> ✓ General information about ZWRM and their activities
15	Consolidated Aluminum Smelter, Extruder, Kitchenware Manufacturing Association (CASEKMA)	<ul style="list-style-type: none"> ✓ General information about CASEKMA, the role and activities ✓ Information on the recycling of Aluminum, the problem faced etc.
16	LINIS GANDA - Metro Manila Federation of Environment Multi-Purpose Cooperation (MMFEMPC)	<ul style="list-style-type: none"> ✓ Background information about the organization ✓ The existing recycling players in the Philippines ✓ Some cost information on recycling in the Philippines ✓ Information on recyclables collected in Metro Manila by LINIS GANDA ✓ The possible material flows of recyclable in the Philippines

No	Organizations	Information Obtained
<i>2) Private Companies</i>		
17	San Miguel Yamamura Asia Corporation	<ul style="list-style-type: none"> ✓ General information of the industry and overall information on glass industries in the Philippines ✓ Information on the existing practice of glass recycling in the Philippines
18	San Miguel Yamamura Ball Corporation	<ul style="list-style-type: none"> ✓ General information of the industry and overall information on Aluminum industries in the Philippines ✓ Detailed process flows of Aluminum production ✓ Information on the existing practice of Aluminum recycling in the Philippines
19	Polytrader Plastic Products	<ul style="list-style-type: none"> ✓ General information of the industry on recycling of polystyrene ✓ Overview of current situation of polystyrene recycling in the Philippines
20	Top Fine Plastic Manufacturing Corporation	<ul style="list-style-type: none"> ✓ General information of the industries ✓ The overall information on the existing plastic recycling system in the Philippines ✓ The price flow of plastic recycling in the market of the Philippines
21	Ecoplast Industries Co. Inc.	
22	San Miguel Packaging Specialist Inc. (SMPS)	<ul style="list-style-type: none"> ✓ General information of the industry in PET production and challenges faced ✓ Information on existing situation of PET recycling in the Philippines ✓ The PET recycling target and future plan of the company
23	Mega Packaging Corporation	<ul style="list-style-type: none"> ✓ General information of the industry in production and recycling of polystyrene ✓ The overall information on the existing polystyrene recycling in the Philippines
24	Noah's Paper Mills Inc.	<ul style="list-style-type: none"> ✓ General information of the industry in paper recycling ✓ Overall information on the existing paper recycling in the Philippines ✓ Statistic on paper mills (with capacity) in the Philippines
25	HMR Envirocycle Philippines Inc.	<ul style="list-style-type: none"> ✓ General information of the industry in recycling of E-wastes as well as paper and polystyrene
26	Trust International Paper Corporation (TIPCO)	<ul style="list-style-type: none"> ✓ General information of the industry in paper manufacturing and paper recycling ✓ Information on existing situation of newsprint (paper) recycling in the Philippines including the pricing

2.2.3 Surveys on Recycling Players / Stakeholders

The selection of recycling players or other relevant stakeholders surveyed in this study was based on the existing recycling system in the markets of the Philippines, where the main players of the entire recycling activities are generally categorized as follows:

- a) Households, business entities and institutions as the waste generators (including recyclable materials)
- b) Primary collectors of recyclable materials

- c) Middlemen, recycling agents, junkshops, recycling centers and traders of recyclable materials
- d) Used materials / second hand shops (particular for electrical and electronic appliances)
- e) Importers and exporters of recyclable materials
- f) Recycling industries or the end users of the recyclable materials

The surveys were carried out at Metro Manila, Metro Cebu and Metro Davao as the main targets, and others in the 16 regions of the Philippines as additional surveys. The total numbers of sample targeted in the study for each category of the stakeholders are decided based on the available budget and timeframe, following the distributions as shown in Table 2.2.2.

The selection of samples was done based on the local conditions of each particular target area, where a well mixed of all possible sample categories was chosen in order to provide most representative findings from the surveys. For selection of households in particular, it was carried out based on the house types and income levels of the respondent areas, namely:

- 1) High income – bungalow houses (single), condominiums
- 2) Medium income – apartments, single detached houses, duplexes, townhouses
- 3) Low income – informal dwelling units

Table 2.2.2 Distribution of Samples by Study Areas

Area	Households				Business Entities and Institutions					Recyclers					Grand Total	
	Low Income	Middle Income	High Income	Sub-Total	Business (Services)	Business (Products)	Offices	Institutions	Sub-Total	Importer / Exporter	Recycling Industries	Traders / Middlemen	Primary Collectors	E-shops		Sub-Total
Metro Manila	125	150	125	400	50	50	50	50	200	8	37	116	28	20	200	809
Metro Cebu	65	70	65	200	25	25	25	25	100	8	16	54	15	11	104	404
Metro Davao	65	70	65	200	25	25	25	25	100	8	16	55	11	10	100	400
Other 16 Regions	0	0	0	0	0	0	0	0	0	4	14	103	0	0	121	121
Total	255	290	255	800	100	100	100	100	400	28	83	328	54	41	534	1,734

On the other hand, for the categories of business entities and institutions, it was further divided into 4 different target groups, namely:

- 1) Service based businesses (e.g. bank, barber, printing shop, photo studios etc.)
- 2) Product based businesses (e.g. restaurants, supermarkets, retail shops, car garages, etc.)

- 3) Offices (e.g. insurance, consulting, accounting and lawyer firms, etc.)
- 4) Institutions (e.g. schools, colleges, government departments, clinics, hospitals and other public amenities)

Both the households, business entities and institutions are sources of waste generation in the entire flow of recyclable materials, while the other category of stakeholders surveyed are the recyclers which were divided into the following categories:

- 1) Primary Collectors – those who recover or segregate recyclable materials directly from the waste stream (such as street pickers, scavengers, etc.)
- 2) Traders / Middlemen / Junkshops / Recycling Centers – Traders of recyclable materials in between the primary collectors and end users; various levels of trading may be involved from smaller scale to bigger scale middlemen, traders or junkshops.
- 3) Recycling Industries – The end users or receivers of the recyclable materials as raw materials of the manufacturing process to produce other products or another raw material such as plastic resins.
- 4) Importers and Exporters – The companies that are importing and exporting recyclable materials (such as scrap plastics and metals) including 2nd hand electrical appliances and E-wastes.
- 5) E-shops – electrical shops that are selling second hand or used electrical and electronic appliances, as well as cell phone batteries.

In terms of the type of recycling industries selected, more detailed breakdown is shown in Table 2.2.3 below.

Table 2.2.3 Detailed Breakdown of Types of Recycling Industries Surveyed

Area	Recycling Industries					Total
	Papers	Plastics	Metals	Glasses	E-wastes	
Metro Manila	5	14	16	1	1	37
Metro Cebu	2	6	8	2	0	18
Metro Davao	1	6	0	0	9	16
16 Regions	4	3	6	0	2	15
Total	12	29	30	3	12	86

Note: 1) No recycling industry is found in Davao for glass.....
 2) Small number of samples achieved in certain areas due to poor cooperation

As shown in Table 2.2.3, the number of recycling industries surveyed for different types of materials is not equal for each area due to the local situation where some recycling industries are not exist in the study area, while some existing recycling industries were found not willing to give cooperation in the surveys.



Figure 2.2.1 Primary Collector



Figure 2.2.2 Middlemen/Recycling Agent



Figure 2.2.3 Recyclable Junkshop



Figure 2.2.4 Recycling Industry



Figure 2.2.5 Activity In a Recycling Industry



Figure 2.2.6 Example of Recycled Product

2.3 Nationwide Macro Material Flow of Recyclable Materials

2.3.1 Waste Papers

Based on the information available from various sources, the material flow of waste paper for year 2004 at macro scale was developed as illustrated in Figure 2.3.1 below.

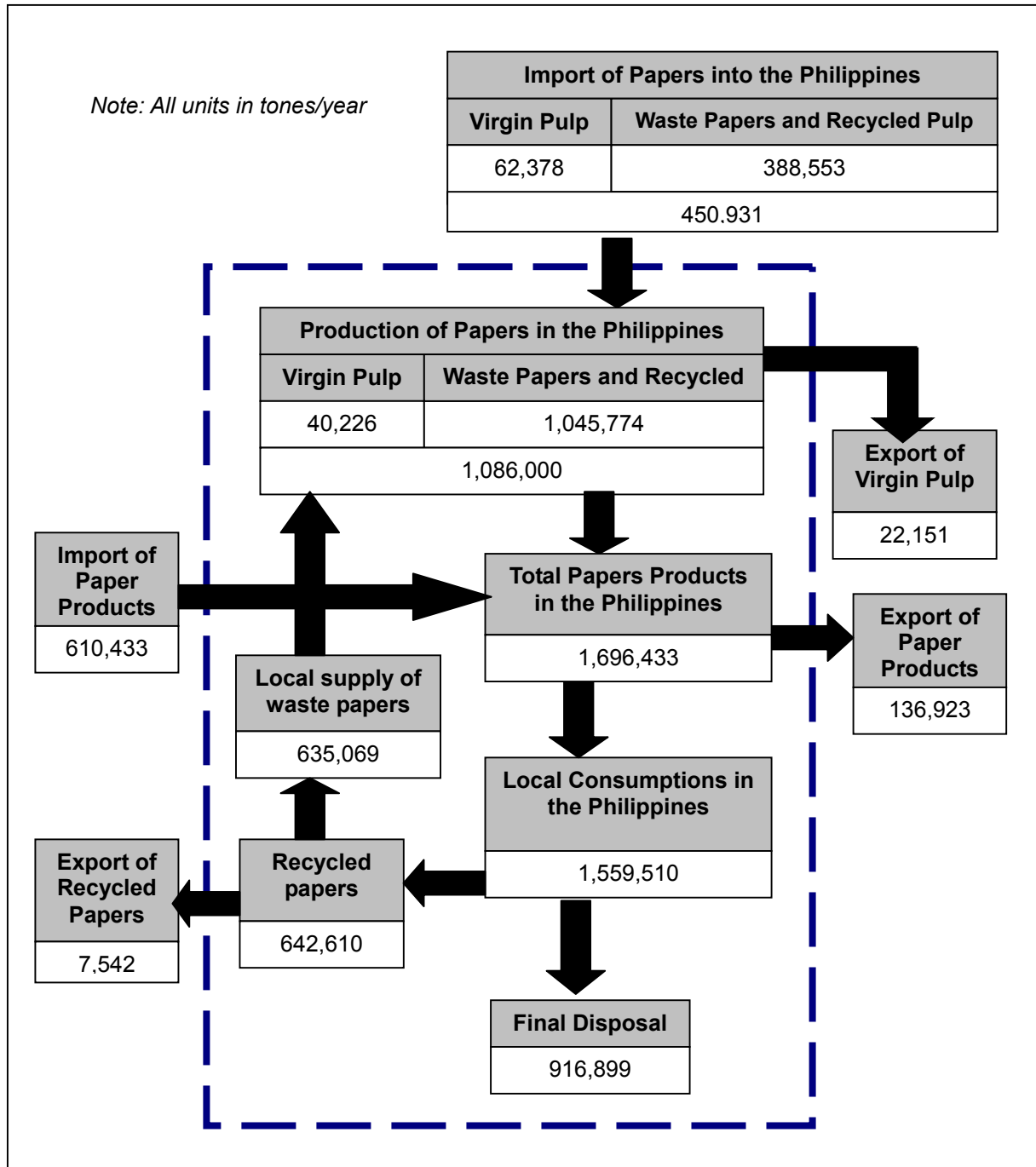


Figure 2.3.1 Material Flow for Waste Paper in the Philippines at Macro Scale

The amount of total production of papers in the Philippines (1,086,000 tones/year) was obtained from the Pulp and Paper Manufacturers Association of the Philippines (PULPAPEL), where the total production of all the paper manufacturers were added, with assumptions that it covers most of the

paper production in the Philippines as majority of the paper manufacturers are the members of PULPAPEL.

On the other hand, the import and export data was obtained from the Foreign Trade Statistics published by the National Statistic Office (NSO) of the Philippines. The import figures of the pulp and waste papers imported into the Philippines were taken as one of the sources for the production of papers (450,931 tones/year), while the balance of the sources are assumed to be from the supply of local waste papers recycled (635,069 tones/year).

In addition, the total import of paper products in the Philippines (610,433 tones/year) were also taken to identify the total paper products available in the Philippines (1,696,433 tones/year), as well as the local consumptions (1,559,510 tones/year) after deduction of the total paper products exported (136,923 tones/year).

Export data for recycled papers was also available from the NSO report (7,542 tones/year) and this amount when added with the local waste paper supplied to the production (635,069 tones/year) as mentioned above, will generally illustrate a figure of total papers recycled in the Philippines, with assumptions that all the paper after consumptions were either recycled or disposed of to the disposal landfill (916,899 tones/year).

In general, it was found that about 1,696,433 tones of paper products, waste papers and pulp were imported into the Philippines in year 2004. Out of this total, only about 166,616 tones were exported out of the country in the form of paper products, recycled papers or pulp. The balance of 1,559,510 tones was consumed locally.

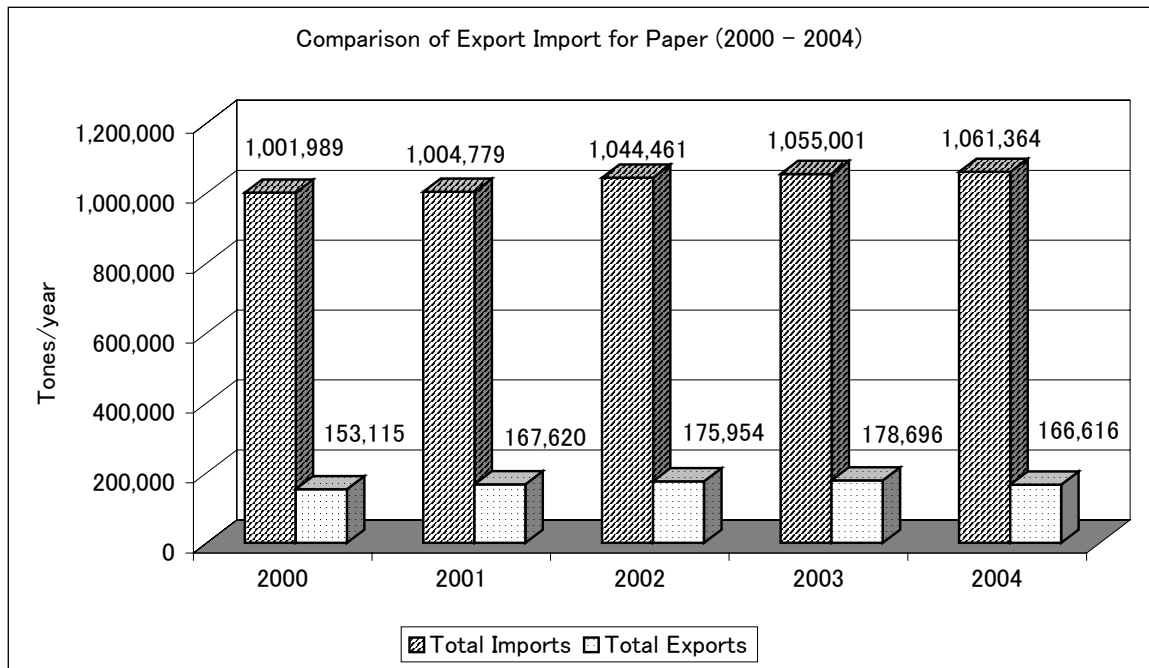
It was also shown that the waste paper and pulp imported account for about 41.5% of the total production in the Philippines, while the balance of 58.5% was from the domestic sources.

Based on this estimation, the current recycling rate of paper in the Philippines was estimated to be around 41.2%, while 58.8% of the papers were still being dumped to the landfill sites. Out the portions of paper recycled, only 0.5% was exported to overseas countries. In terms of finished products, 12.6% was exported while the remaining was consumed domestically.

Based on the estimated population of 87,893,560 for the Philippines in year 2004, it was estimated that the paper consumption in the Philippines for year 2004 was about 17.74 kg/cap/year or 0.049 kg/cap/day.

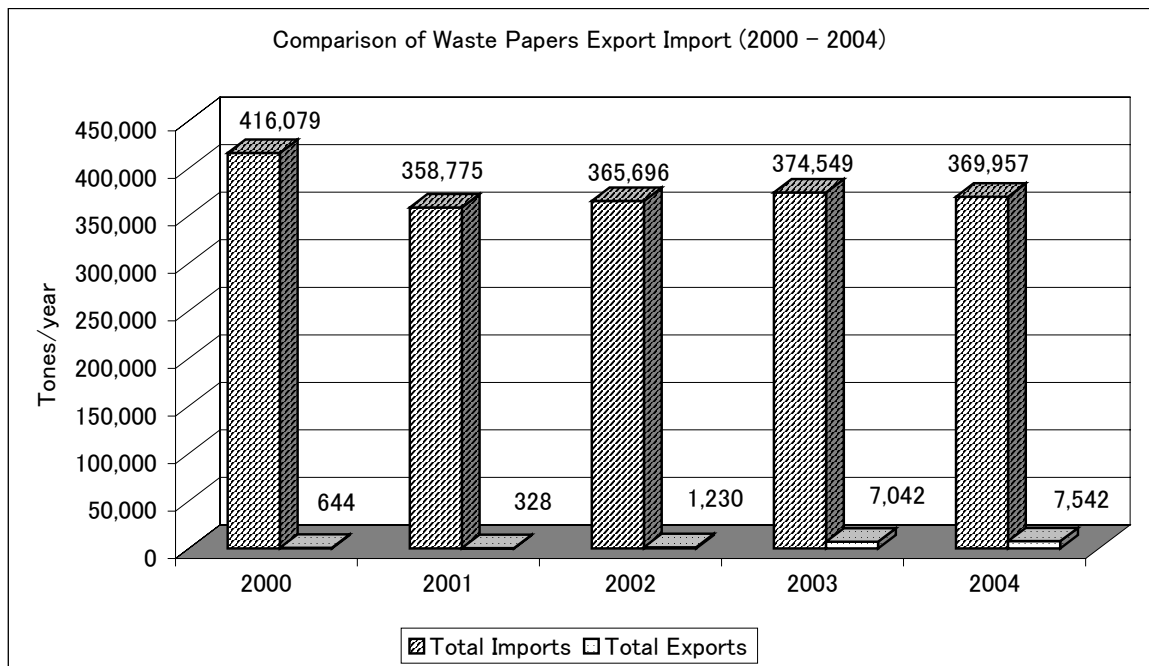
In comparison with the data on export and import for the past 5 years (2000 to 2004) extracted from the DSO Report, it was found that the imports of paper in general was much higher than exports both in terms of total amount as well as only waste papers in particular (Figure 2.3.2 and Figure 2.3.3).

In general, it was observed that the imports and exports of papers in the Philippines were quite constant and stable for the past 5 years, except some increase in exports of waste paper from year 2001 to 2003.



	2000	2001	2002	2003	2004
Total Import	1,001,989	1,004,779	1,044,461	1,055,001	1,061,364
Total Export	153,115	167,620	175,954	178,696	166,616

Figure 2.3.2 Comparison of Total Export and Import for Paper (2000-2004)



	2000	2001	2002	2003	2004
Total Import	416,079	358,775	365,696	374,549	369,957
Total Export	644	328	1,230	7,042	7,542

Figure 2.3.3 Comparison of Export and Import for Waste Papers (2000-2004)

From the records of import and export, it was found that the biggest 10 countries that export waste papers to the Philippines based on volume are listed in Table 2.3.1.

Table 2.3.1 Biggest Exporter Countries for Waste Papers into the Philippines

No	Countries	Volume (tones/year)	%	Amount (Peso/year)
1	Australia	83,915	22.7	375,072,113
2	Japan	62,789	17.0	425,511,412
3	United States of America	62,404	16.9	643,731,021
4	Hong Kong	28,726	7.8	114,412,731
5	Germany	26,447	7.1	107,312,885
6	United Arab Emirates	20,363	5.5	146,873,405
7	New Zealand	18,582	5.0	94,281,712
8	Netherlands	18,300	4.9	71,198,890
9	Singapore	14,752	4.0	119,545,220
10	UK and North Ireland	6,360	1.7	31,801,876
11	Others	27,319	7.4	160,763,412
Total		369,957	100.0	2,290,504,677

Note: Based on data of year 2004

In addition to these 10 countries, some other countries that exported waste papers to the Philippines are South Korea, Thailand, Saudi Arabia, Malaysia, Norway, Belgium, China, Suriname, Taiwan, Indonesia, Aruba, Greece, France, Canada, Egypt, Ireland, Vietnam, Denmark, Kuwait, Israel, Sweden, Sri Lanka, Iran, Bosnia, and Herzegovina.

On the other hand, only 9 countries were found importing waste papers from the Philippines, as listed in Table 2.3.2 below.

Table 2.3.2 Importer Countries for Waste Papers and Recycled Pulp from the Philippines

No	Countries	Volume (tones/year)	%	Amount (Peso/year)
1	Indonesia	3,484	46.2	23,053,935
2	China	1,714	22.7	8,261,331
3	Singapore	769	10.2	6,029,435
4	Vietnam	711	9.4	4,073,051
5	India	426	5.6	3,567,416
6	Thailand	315	4.2	6,050,761
7	Taiwan	75	1.0	265,463
8	Korea	48	0.6	277,689
9	Cyprus	0.14	0.0	1,396
Total		7,542	100.0	51,580,477

Note: Based on data of year 2004

In terms of percentage, the countries of imports and exports for waste papers in the Philippines for year 2004 are illustrated in Figure 2.3.4 and Figure 2.3.5 below.

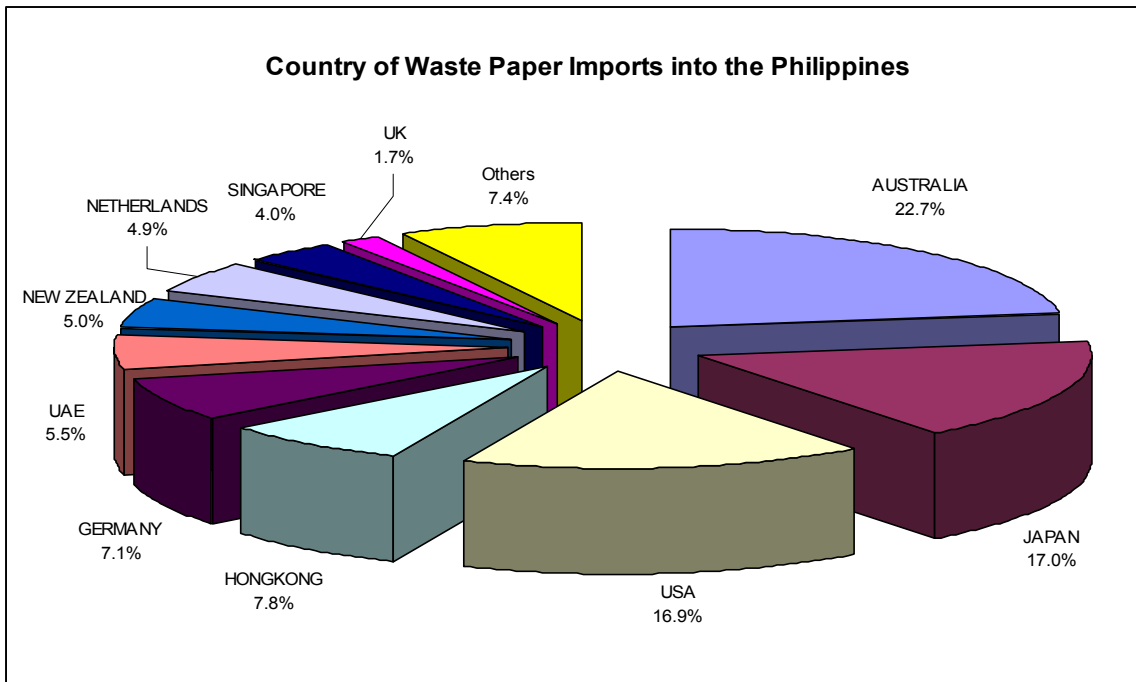


Figure 2.3.4 Countries of Waste Paper Imports into the Philippines (2004)

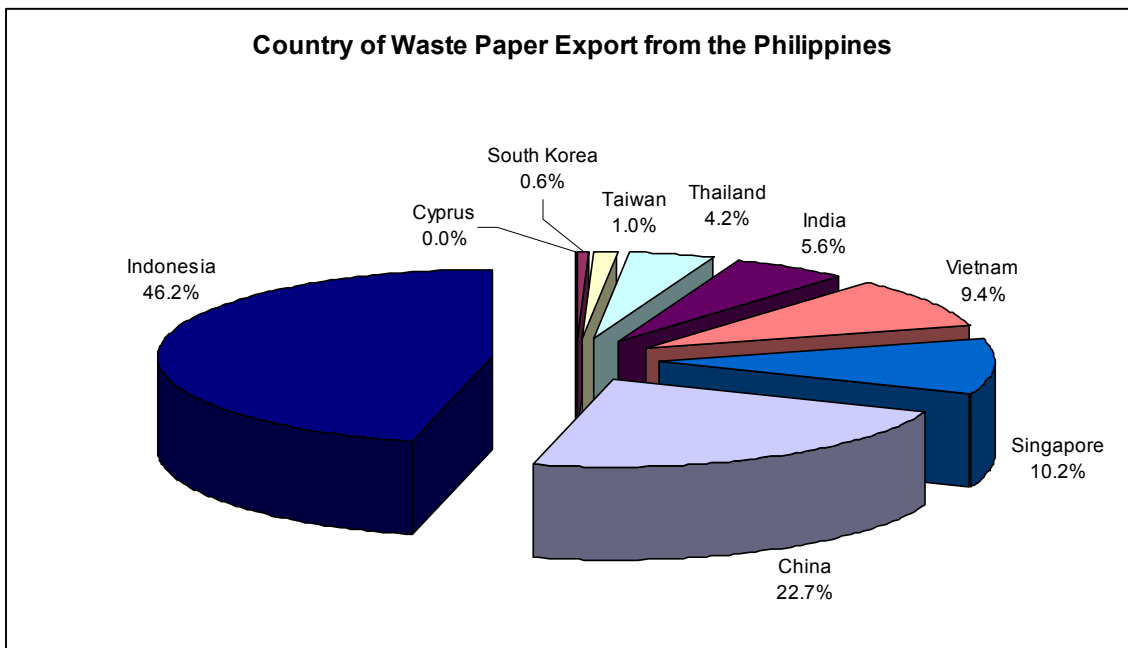


Figure 2.3.5 Countries of Waste Paper Exports from the Philippines (2004)

2.3.2 Scrap Metal

(1) Scrap iron

The macro scale material flow for scrap iron was summarized in Figure 2.3.6 below based on the data of “2005 Steel Statistical Yearbook” published by SEAISI³ and 2004 Foreign Trade Statistics of the Philippines as a supplement.

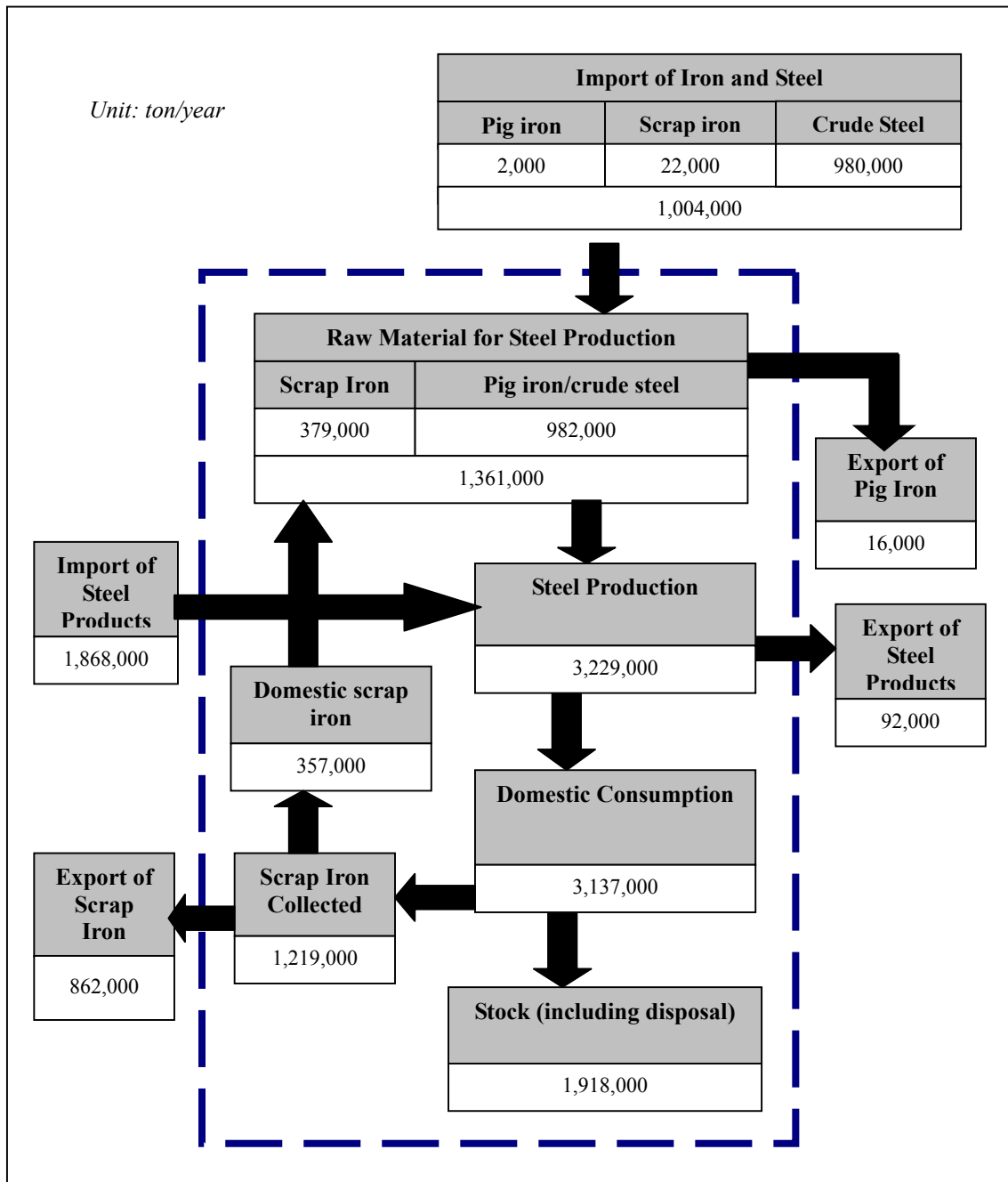


Figure 2.3.6 Material Flow for Scrap Iron in the Philippines at Macro Scale

³ SEAISI: South East Asia Iron and Steel Institute

Meanwhile, the Table 2.3.3 shows the detailed breakdown of iron and steel products in the Philippines between 2000 and 2004.

Table 2.3.3 Breakdown of Iron and Steel Production in the Philippines (2000-2004)

Item	2000	2001	2002	2003	2004
100 Iron Products	-	N.A.	-	-	-
110 Pig Iron	-	N.A.	-	-	-
120 DRI	-	N.A.	-	-	-
130 HBI	-	N.A.	-	-	-
200 Ferro Alloys	-	N.A.	-	-	-
300 Crude Steel Products	426,000	N.A.	550,000	500,000	400,000
310 Ingots	-	N.A.	-	-	-
320 Continuous Cast	426,000	N.A.	4,671,000	425,000	400,000
321 Billet	426,000	N.A.	4,671,000	425,000	400,000
322 Bloom	-	N.A.	-	-	-
323 Slab	-	N.A.	-	-	-
324 Others (eg: beam blanks)	-	N.A.	-	-	-
330 Steel for Castings	-	N.A.	83,000	75,000	-
340 by Oxygen-blown Converters	-	N.A.	-	-	-
350 by Electric Furnace	426,000	N.A.	467,000	425,000	400,000
360 by other Furnace	-	N.A.	83,000	75,000	-
400 Hot-rolled Steel Products	1,405,000	N.A.	1,632,000	1,770,000	1,265,000
410 Rails & Accessories	-	N.A.	-	-	-
420 Steel Sheet Piles	-	N.A.	-	-	-
430 Sections	200,000	N.A.	377,000	415,000	270,000
440 Bars	1,185,000	N.A.	1,255,000	1,355,000	995,000
450 Wire Rods	20,000	N.A.	-	-	-
460 Rounds for Tubes	-	N.A.	-	-	-
470 Plates	-	N.A.	-	-	-
480 Hot-rolled Sheets & Strips	-	N.A.	-	-	-
481 Carbon Steels	-	N.A.	-	-	-
482 Stainless Steels	-	N.A.	-	-	-
483 Others (eg: alloys)	-	N.A.	-	-	-
409 Tires & Wheels	-	N.A.	-	-	-
500 Cold-rolled Products	220,000	N.A.	240,000	230,000	155,000
510 Cold-rolled Sheets & Strips	220,000	N.A.	240,000	230,000	150,000
511 Carbon Steels	N.A.	N.A.	240,000	230,000	150,000
512 Stainless Steel	N.A.	N.A.	-	-	-
513 Others (eg: alloys)	N.A.	N.A.	-	-	-
520 Cold-rolled Electrical Sheets	-	N.A.	-	-	-
600 Coated Sheets & Strips	510,000	N.A.	533,000	484,000	404,000
610 Galvanized Sheets	350,000	N.A.	283,000	243,000	283,000
611 Hot Dip (CGI)	N.A.	N.A.	283,000	243,000	283,000
612 EGI	N.A.	N.A.	-	-	-
620 Timplates	-	N.A.	-	-	-
690 Others	160,000	N.A.	250,000	241,000	121,000
691 Zn-Al	100,000	N.A.	170,000	161,000	-
692 Color Coated	60,000	N.A.	80,000	80,000	121,000
693 Others	-	-	-	-	-

Item	2000	2001	2002	2003	2004
700 Pipes & Tubes	132,000	N.A.	193,000	210,000	102,000
710 Seamless Pipes & Tubes	N.A.	N.A.	-	-	-
720 Welded Pipes & Tubes	N.A.	N.A.	193,000	210,000	102,000
800 Cold-formed Sheet Piles	-	N.A.	-	-	-
810 Cold-formed Sheet Piles	-	N.A.	-	-	-
820 Cold-formed Sections	-	N.A.	-	-	-
830 Cold Drawn Bars	N.A.	N.A.	-	-	-
840 Steel Wires	N.A.	N.A.	-	-	-
Finished Steel Products					
Rails & Accessories	-	N.A.	-	-	-
Steel Sheet Piles *1)	-	N.A.	-	-	-
Sections *2)	20,000	N.A.	377,000	415,000	27,000
Bars	1,185,000	N.A.	1,255,000	1,355,000	995,000
Wire Rods	20,000	N.A.	-	-	-
Plates	-	N.A.	-	-	-
Hot-rolled Sheets & Strips	-	N.A.	-	-	-
Tires & Wheels	-	N.A.	-	-	-
Cold-rolled Sheets & Strips	220,000	N.A.	240,000	230,000	155,000
Cold-rolled Electrical Sheets	-	N.A.	-	-	-
Galvanized Sheets	290,000	N.A.	283,000	243,000	283,000
Tinplates	-	N.A.	-	-	-
Other Metallic-coated Sheets	60,000	N.A.	250,000	241,000	121,000
Pipes & Tubes	132,000	N.A.	193,000	210,000	102,000
Finished Steel Products Total	2,107,000	N.A.	2,598,000	2,694,000	1,926,000

Data source: 2005 Steel Statistic Yearbook published by SEAISI

The table below shows the apparent consumption of total steel products in the Philippines. It clearly indicates a large dependence upon imports of iron and steel products to meet the domestic demand in the Philippines.

Table 2.3.4 Apparent Steel Consumption of Total Steel Products

	2000	2001	2002	2003	2004
Production(A)	1,405,000	N.A.	1,632,000	1,770,000	1,265,000
(Hot-rolled Steel Products)					
Import(B)	1,636,000	N.A.	2,103,000	1,822,000	1,867,945
Export(C)	-	N.A.	-	-	92,339
Apparent Steel Consumption (A) + (B) - (C)	3,041,000	N.A.	3,735,000	3,590,000	3,040,606

Data source: 2005 Steel Statistic Yearbook published by SEAISI

Table 2.3.5 below shows the steel consumption by types of finished products. Dependence upon import can be found in most of the products starting from semi-finished to finished products.

Table 2.3.5 Apparent Steel Consumption by Finished Steel Products

	2000	2001	2002	2003	2004			Apparent Steel Consumption
	Apparent Steel Consumption	Apparent Steel Consumption	Apparent Steel Consumption	Apparent Steel Consumption	Production	Import	Export	
Finished Steel Products					(A)	(B)	(C)	(A)+(B)-(C)
Rails & Accessories	1,000	-	-	-	-	735	-	735
Steel Sheet Piles	11,000	-	-	-	-	5,904	-	5,904
Sections	296,000	348,000	504,000	525,000	270,000	122,778	-	392,778
Bars	1,225,000	1,367,000	1,255,000	1,355,000	995,000	35,975	-	1,030,975
Wire Rods	276,000	235,000	394,000	295,000	-	311,587	-	311,587
Plates	-	-	-	-	-	94,088	-	94,088
Hot-rolled Sheets & Strips	565,000	448,000	814,000	688,000	-	474,318	-	474,318
Tires & Wheels	-	-	-	-	-	-	-	-
Cold-rolled Sheets & Strips	541,000	140,000	665,000	610,000	155,000	438,329	8,000	585,329
Cold-rolled Electrical Sheets	-	-	-	-	-	3,789	-	3,789
Galvanized Sheets	343,000	440,000	283,000	243,000	283,000	78,148	40,000	321,148
Tinplates	153,000	210,000	212,000	220,000	-	237,260	-	237,260
Other Metallic-coated Sheets	200,000	120,000	336,000	325,000	121,000	6,635	32,470	95,165
Pipes & Tubes	132,000	125,000	238,000	255,000	102,000	58,399	11,869	148,530

Data source: 2005 Steel Statistic Yearbook published by SE AISI

The key characteristics of scrap iron recycling and iron and steel industry can be outlined as follows:

- a Import of iron and steel product was about 2.8 million tons in 2004 while its export was only about 100 thousand tons. Major country origins of iron and steel product import are Russia (about 40% of total import), followed by Japan, China and Ukraine. Import of semi-finished products such as billets occupies 1/3, while the remaining are finished products. Most of semi-finished products come from Russia and Ukraine while the finished ones are imported from various countries.
- b Due to limited production capacity of iron & steel products, approximately 1.8 million tons were imported (2004) to meet the domestic demand.
- c Annual consumption of steel products is 3.7 million tons (2004), equivalent with per capita consumption of 37kg, which is much smaller than neighboring countries. About 60% of steel consumption is for construction while the consumption of high-grade steel products (for cars and home appliances) is limited and depends upon import.
- d Export of iron scrap has been drastically increasing due to shut down of large domestic billet makers, increase of iron scrap price due to increasing demand in China, and increase in generation of iron scrap with the reconstruction and demolition of the buildings since 2002.

2.3.3 Scrap Aluminum

The figure below is the estimated material flow of aluminum based on 2004 foreign trade statistics of the Philippines published by NSO, and materials provided by the Consolidated Aluminum Smelter, Extruder & Kitchenware Manufacturing Association (CASEKUMA).

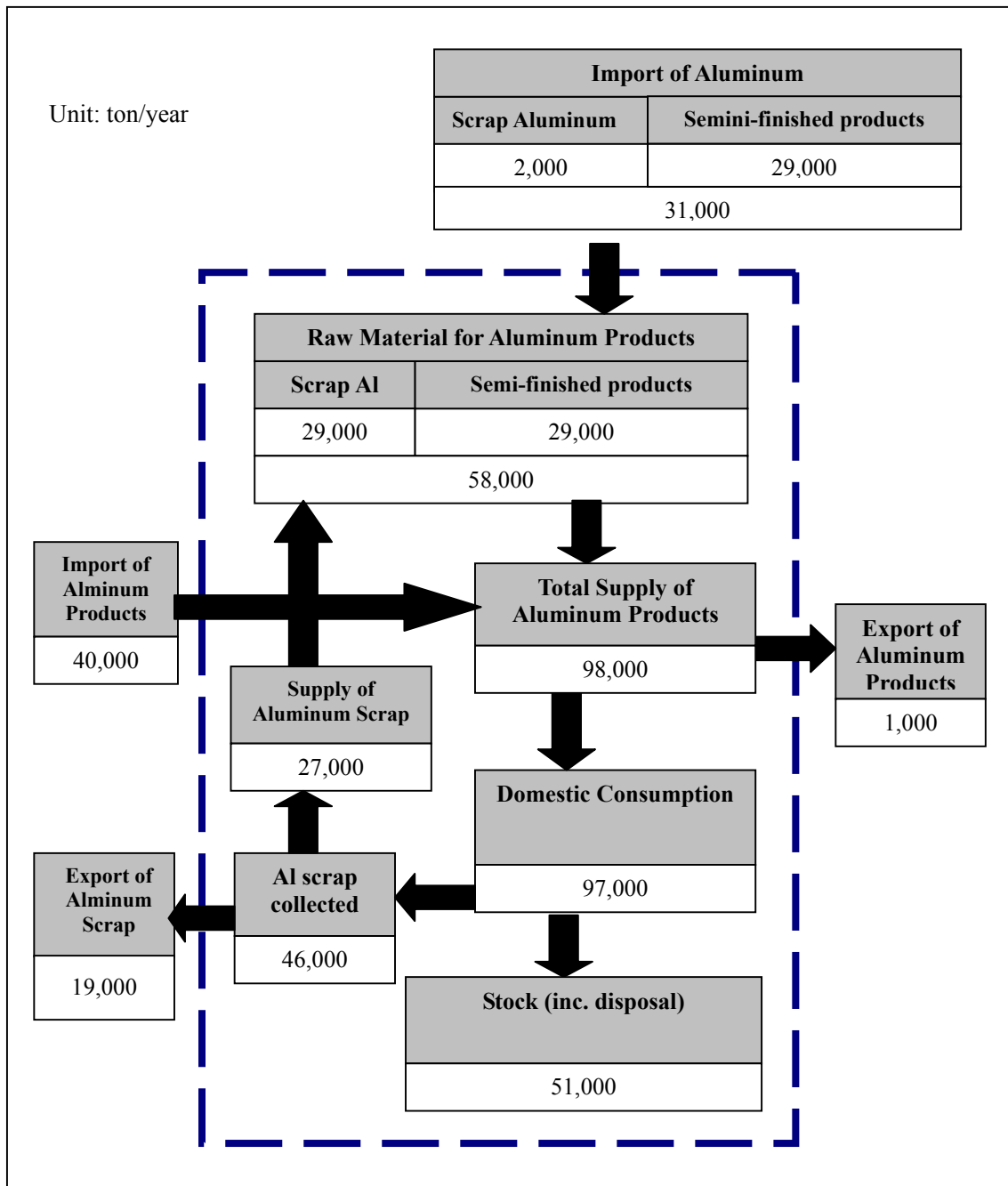


Figure 2.3.7 Estimated Material Flow of Aluminum (2004)

Scrap aluminum recycling and aluminum industry in the Philippines can be characterized as follows:

- a Import of aluminum products (inc. semi-finished ones) was more or less 70 thousand annually during 2000-2004 while its export was less than one

thousand tons in 2004. Major country origins of aluminum products import are Australia, followed by South Korea, Indonesia and China.

- b Current aluminum production is estimated as 60 to 70 thousand tons, drastic decrease from 300 thousand tons in 1997, 120 thousand tons in 2002 due to severe competition with import products.
- c No primary aluminum smelter and dependence upon import of aluminum ingots (approx. 30 thousand tons in 2004) and domestic procurement aluminum scrap (estimated around 50 thousand tons, but about 20 thousand tons were exported in 2004)
- d Import of finished aluminum product was 40 thousand tons in 2004 and Annual aluminum products consumption is approx. 1 to 1.1 million tons in 2004.

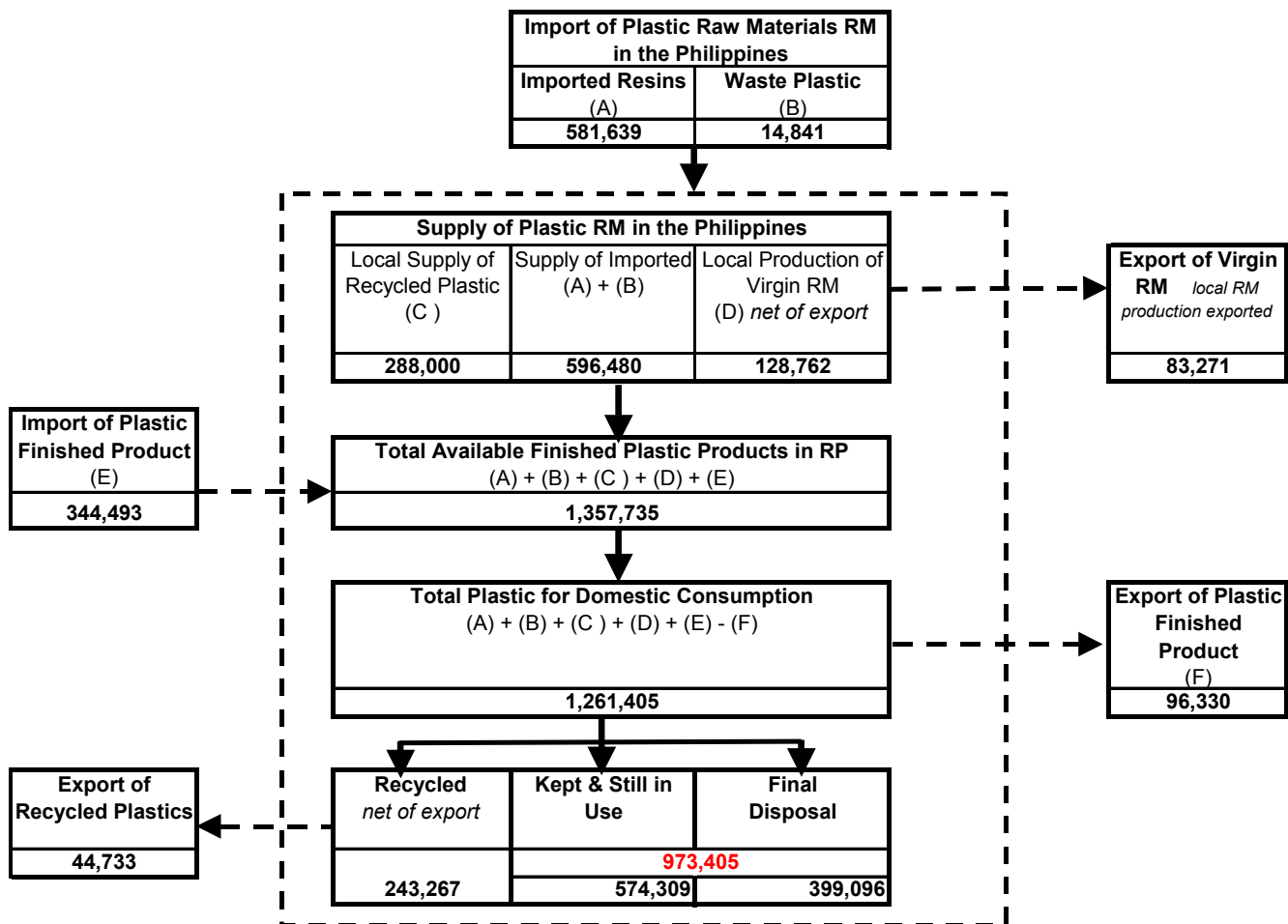
2.3.4 Scrap Plastics

For plastics industry in the Philippines, the macro scale material flow was identified as summarized in Figure 2.3.8. Information used was obtained from various sources as described in the following section.

The information on the total production of plastic industries in the Philippines was available from the directory of Philippines Plastics Industry Association (PPIA), where the total production was published as about 1,000,000 tones/year. The supply for the plastics production was obtained from imported resin and waste plastics (reported in NSO import statistics year 2004: 581,639 tones/year of resin and 14,841 tones/year of waste plastics), as well as some local recycled plastics materials. It was assumed that the difference between the total production and the total imports of resin and waste plastics was the local supply of the recycled plastics, which gives an annual amount of about 13,817 tones/year.

In addition, NSO statistics on import of plastic products (344,493 tones/year), export of plastic products (96,330 tones/year), resin (83,271 tones/year) and waste plastics (44,733 tones/year) were also used in estimating the material flow. The total plastics products available in the Philippines were the total of plastics production plus the total plastics products imported (1,357,735 tones/year). On the other hand, after deducted the total of plastics products exported, the balance is assumed to be the total local consumption of plastics in the Philippines (1,261,405 tones/year).

The amount of local supply of the recycled plastics (243,267 tones/year) and amount of recycled plastics exported (44,733 tones/year) give a total figure on total plastics recycled in the Philippines (288,800 tones/year). Out of the remaining 973,405 tones/year of the waste plastics, PPIA estimates that about 400 thousand tons will be disposed at landfills while the other 574 thousand tons are still in use.



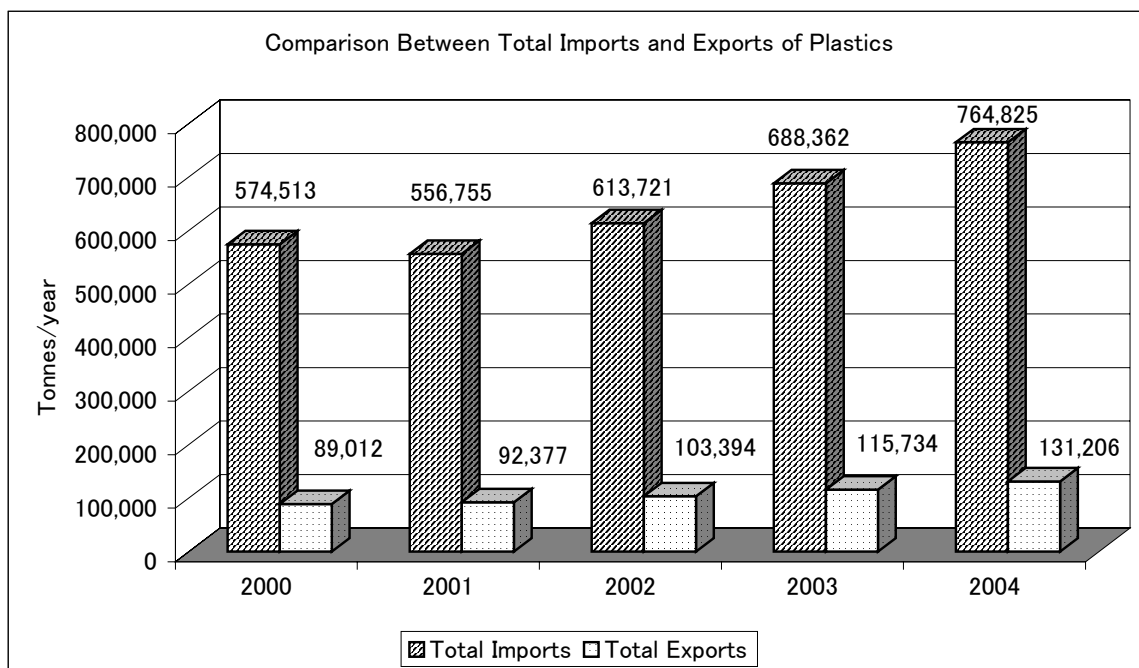
Source: National Statistics Office
Data on Recycling are PPIA estimates on MPRAI and Non-MPRAI operating capacities

Figure 2.3.8 Material Flow for Scrap Plastics in the Philippines at Macro Scale

In terms of percentage, it was found that the waste plastics imported accounts for about 1.5% of the total production, while the local supply of recycled plastics was about 24%.

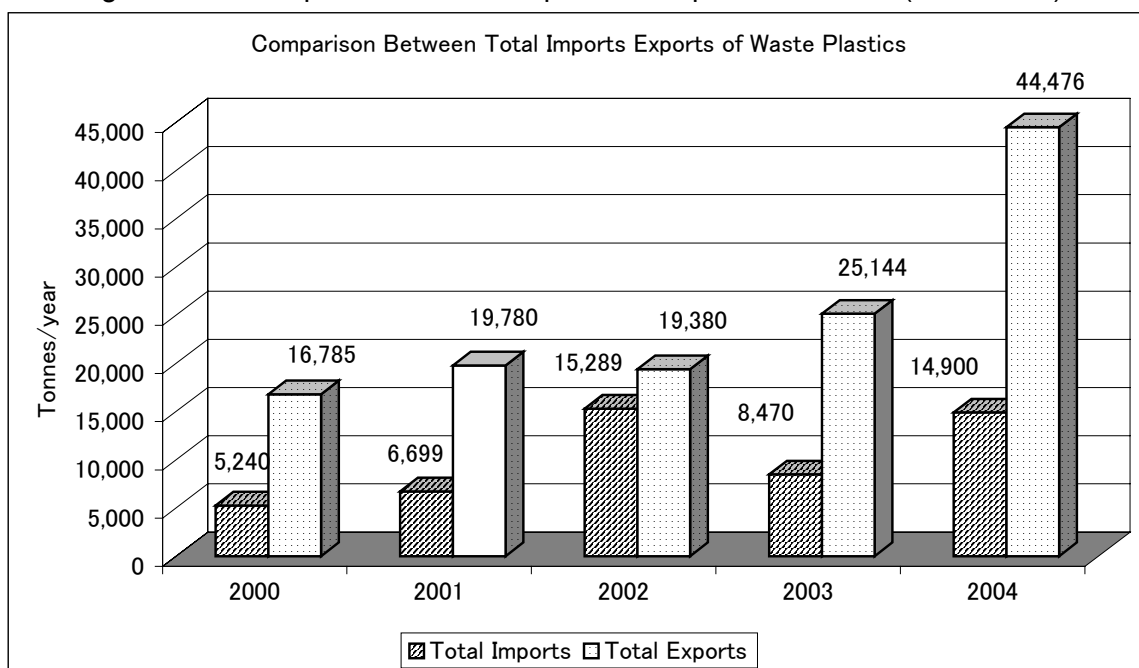
In overall, only 7% of the plastic products were exported while the remaining 93% was consumed domestically. Based on the estimated population of 87,893,560 in year 2004, it was calculated that the plastics consumption rate in the Philippines was about 0.014 tones/capita/year, or 0.039 kg/capita/day.

In comparison with the data on export and import for the past 5 years (2000 to 2004) extracted from the NSO Report, it was found that the total imports of plastics was much higher than total exports both in terms of total amount (Figure 2.3.9 & Figure 2.3.10).



	2000	2001	2002	2003	2004
Total Import	574,513	556,755	613,721	688,362	764,825
Total Export	89,012	92,377	103,394	115,734	131,206

Figure 2.3.9 Comparison of Total Export and Import for Plastics (2000-2004)



	2000	2001	2002	2003	2004
Total Import	5,240	6,699	15,289	8,470	14,900
Total Export	16,785	19,780	19,380	25,144	44,476

Figure 2.3.10 Comparison of Total Export and Import for Scrap Plastics (2000-2004)

It can be seen from the figures that generally the imports and exports of plastics products and scrap plastics have been following the similar trend for the past 5 years. The total imports and exports have recorded stable increase for since 2001, while the imports and exports of scrap plastics were

found to experience more fluctuations throughout the 5 years. It is observed that the exports of scrap plastics were generally higher than the imports of scrap plastics. The fluctuations of market prices for scrap plastics were also one of the key factors to cause fluctuations in imports and exports of scrap plastics in most of the countries. In addition, it was also possibly due to the fact that certain plastics categories may not have local demand because of the limited capacity locally or the local recycling industry for certain plastics is not exists (Based on information obtained from PPIA and SWMC).

The details of the imports and exports for specific plastics materials for year 2000 to 2004 analyzed from the DSO statistics were summarized in Table 2.3.6 and Figure 2.3.11 to Figure 2.3.16 below.

Table 2.3.6 Import and Export of Waste Plastics by Category in the Philippines (2000 – 2004)

Plastics Category	2000		2001		2002		2003		2004	
	Import	Export	Import	Export	Import	Export	Import	Export	Import	Export
HDPE	41.6	0.0	0.0	10.0	18.6	0.0	2.0	0.0	155.9	99.9
PET	69.8	465.6	237.2	467.1	3,497.4	1,128.0	580.1	2,215.3	979.6	4,612.8
PP	283.4	471.3	149.3	1,045.6	365.5	149.5	579.7	47.7	185.2	890.4
PS	203.6	7,550.6	29.2	7,568.3	26.2	5,323.1	5,618.8	3,685.6	360.3	8,101.2
PVC	4,641.6	7,703.1	6,256.7	10,275.8	11,351.2	12,151.7	0.0	18,488.6	12,706.8	29,785.8
Others	0.00	594.1	26.9	413.0	29.7	627.5	8.5	706.9	512.4	985.6
TOTAL	5,240.0	16,784.7	6,699.3	19,779.8	15,288.6	19,379.8	6,789.1	25,144.1	14,900.2	44,475.7

Note: HDPE – High Density Polyethylene
 PET – Polyethylene Terephthalate
 PP – Polypropylene
 PS – Polystyrene
 PVC – Polyvinyl Chloride
 Others – Scrap, Of Phenolic / Amino Resins, Alkyds & Other Polyesters

It was observed that the import and export of plastics in the Philippines varies throughout the years, but exports amount were found to be higher than imports in general as indicated by the recyclers that the prices and demands in overseas were higher. The exports have generally increased for the last two years except for HDPE.

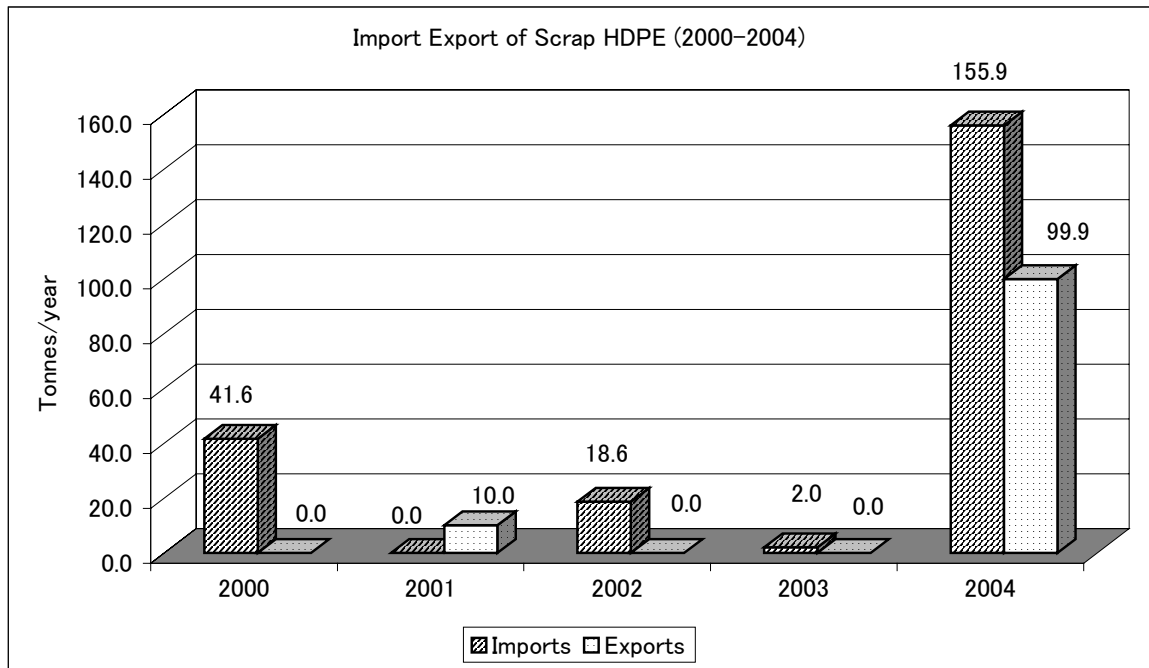


Figure 2.3.11 Total Export and Import for Scrap HDPE (2000-2004)

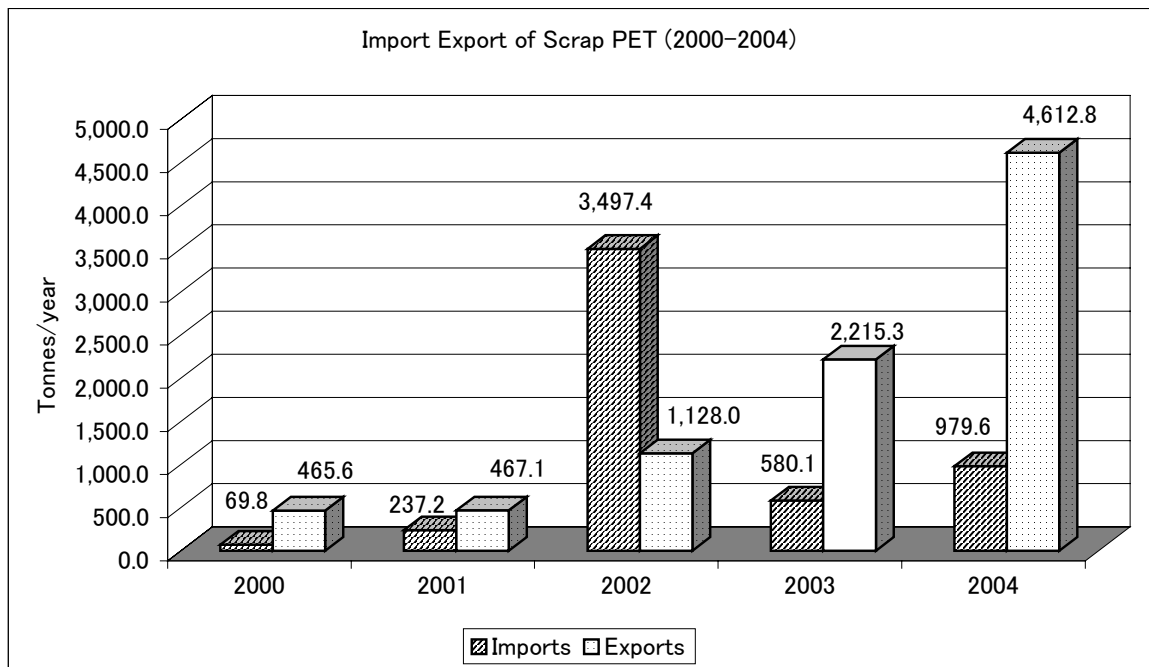


Figure 2.3.12 Total Export and Import for Scrap PET (2000-2004)

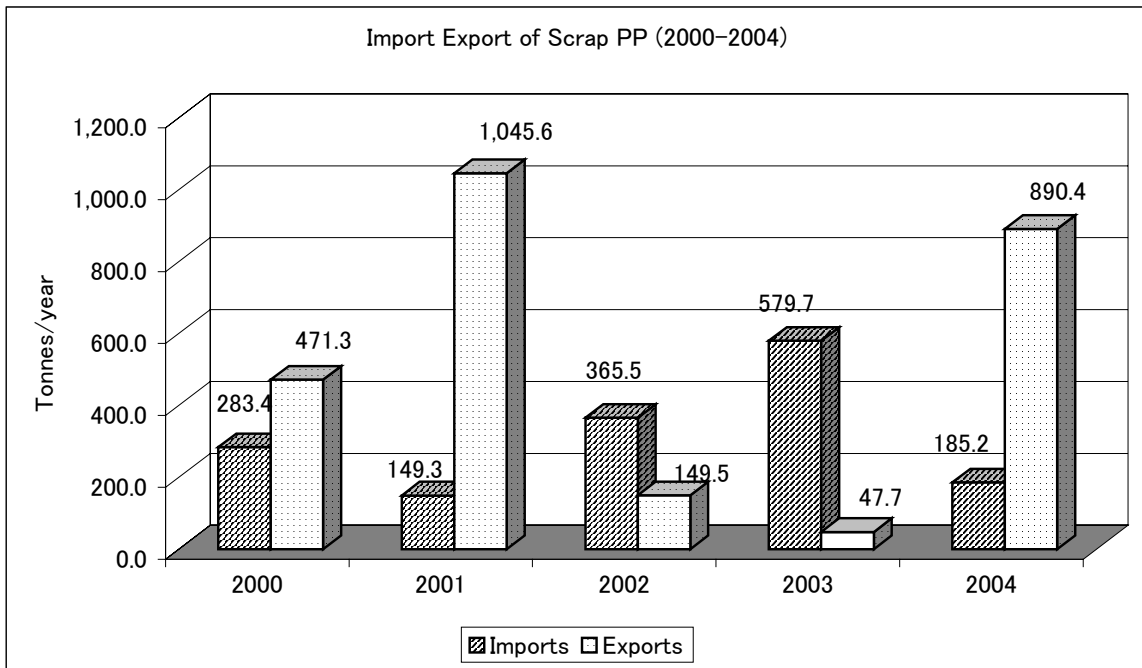


Figure 2.3.13 Total Export and Import for Scrap PP (2000-2004)

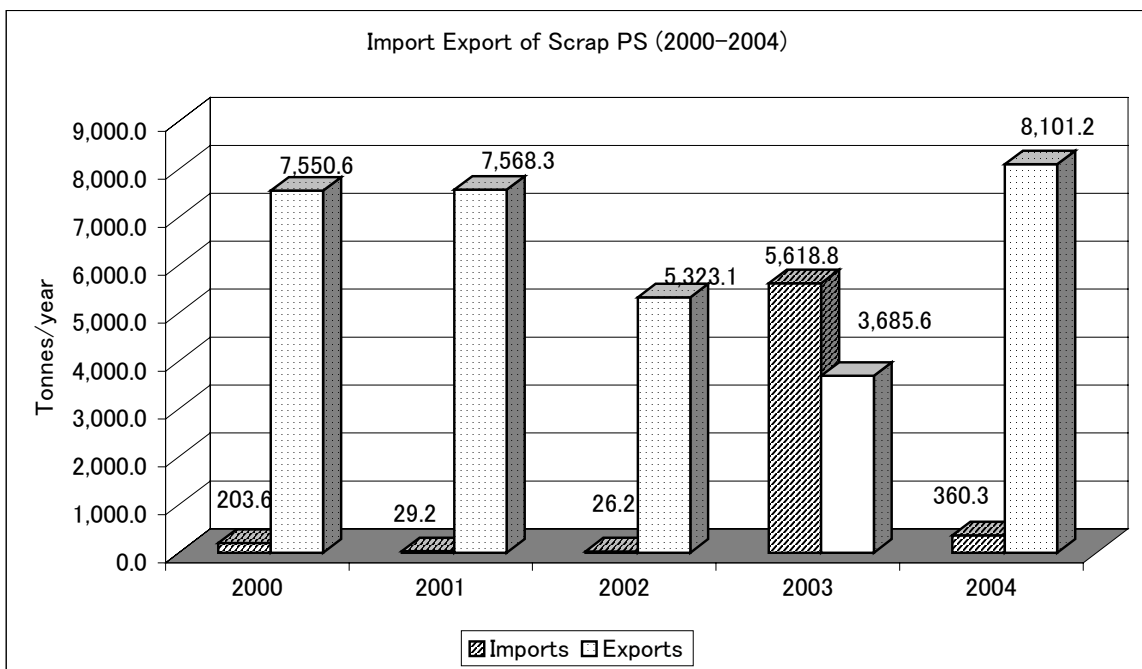


Figure 2.3.14 Total Export and Import for Scrap PS (2000-2004)

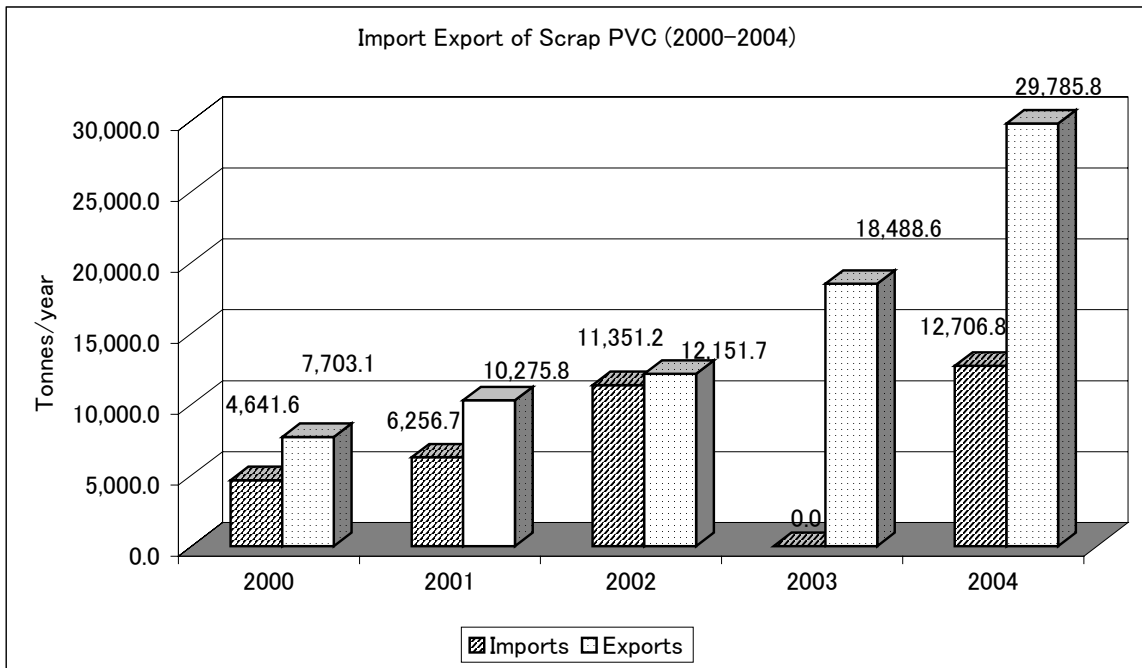


Figure 2.3.15 Total Export and import for Scrap PVC (2000-2004)



Figure 2.3.16 Total Export and import for Other Scrap Plastics (2000-2004)

In terms of countries for exports and imports, it was found that the scrap plastics imported by the Philippines are mostly come from the countries as listed in Table 2.3.7 and Figure 2.3.17. Other countries that are also exporting scrap plastics into the Philippines are such as China, Kuwait, Belgium, France, Thailand, Hong Kong, UK, Indonesia, Sweden, Vietnam and Italy.

Table 2.3.7 Major Exporter Countries for Waste Plastics into the Philippines

No	Countries	Volume (tones/year)	%	Amount (Peso/year)
1	Germany	5,024	33.7	71,617,996
2	India	2,038	13.7	17,282,332
3	Japan	1,857	12.5	24,569,431
4	South Korea	1,057	7.1	20,471,269
5	Netherlands	675	4.5	9,648,336
6	Saudi Arabia	589	4.0	5,040,737
7	Singapore	587	3.9	5,010,741
8	Taiwan	530	3.6	7,661,379
9	USA	496	3.3	6,958,440
10	Malaysia	467	3.1	4,265,645
11	Others	1,582	10.6	21,504,689
Total		14,900	100.0	194,030,995

Note: Based on data of year 2004

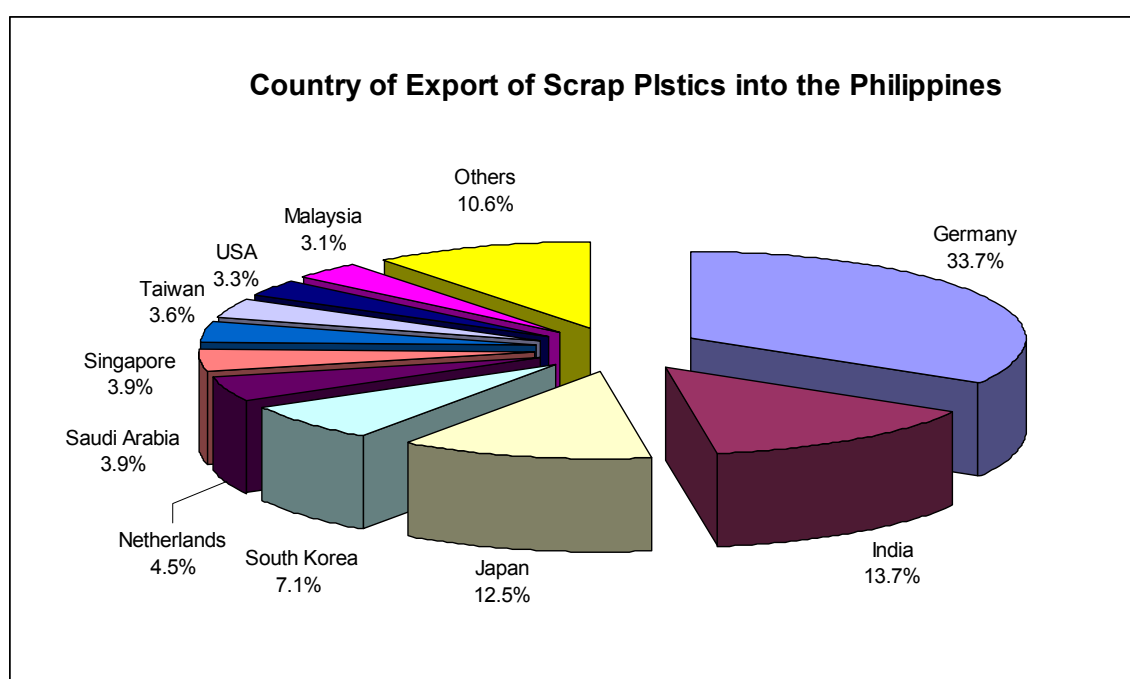


Figure 2.3.17 Country of Exports of Scrap Plastics into the Philippines (2004)

On the other hand, the scrap plastics in the Philippines were found to be exported to overseas buyers, where the major 10 importers are listed in Table 2.3.8 and Figure 2.3.18. Other countries that import scrap plastics from the Philippines include Sri Lanka, Singapore, Congo, Japan, Indonesia, Thailand, USA, Palau, Honduras, Ghana, Saudi Arabia, Germany, Canada and Sudan.

Table 2.3.8 Major Importer Countries for Waste Plastics from the Philippines

No	Countries	Volume (tones/year)	%	Amount (Peso/year)
1	Hong Kong	19,932	44.8	279,356,443
2	China	15,676	35.2	203,495,490
3	Taiwan	2,279	5.1	45,382,942
4	Malaysia	2,004	4.5	39,050,472
5	South Korea	1,144	2.6	23,611,322

No	Countries	Volume (tones/year)	%	Amount (Peso/year)
6	Tanzania	579	1.3	11,655,511
7	Nigeria	469	1.1	6,486,499
8	Israel	398	0.9	10,389,218
9	South Africa	348	0.8	5,398,131
10	Vietnam	324	0.7	13,592,244
11	Others	1,323	3.0	38,296,682
Total		44,476	100.0	676,714,954

Note: Based on data of year 2004

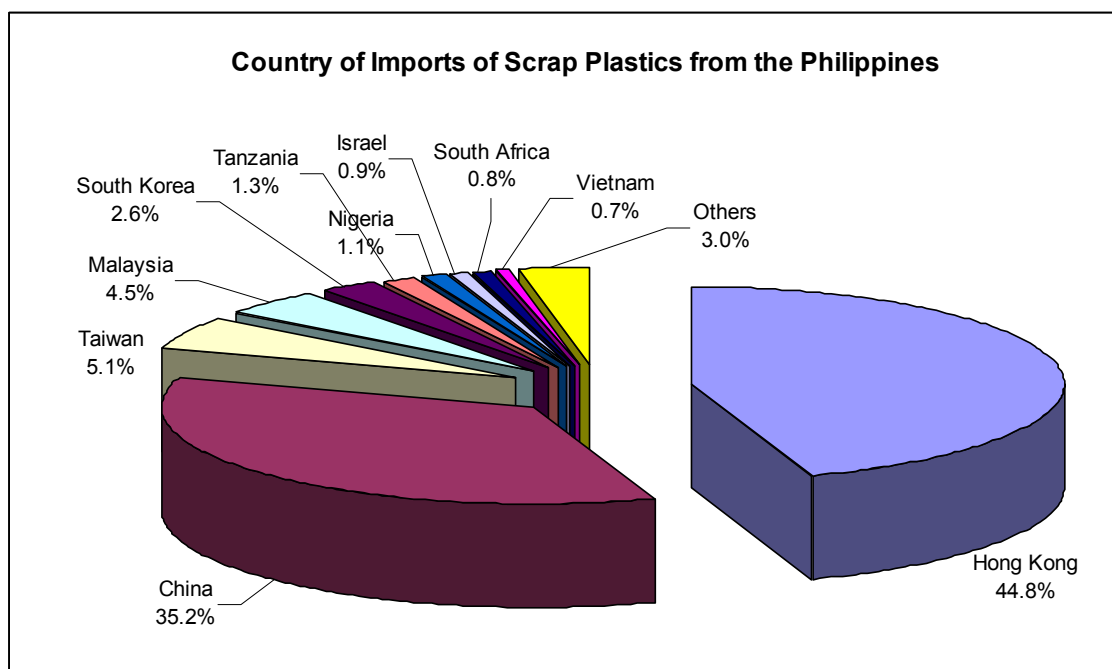


Figure 2.3.18 Country of Imports of Scrap Plastics from the Philippines (2004)

2.3.5 Used Glass Bottles

The material flow of glass in the Philippines was developed focusing only on glass bottles and glass containers which are recyclable following the categories of the NSO coding system. Other categories of products such as beverage and food which may contain glass bottles or containers were excluded in the estimation as there is no clear differentiation whether these products were using glass packaging, plastics packaging, aluminum or other packaging materials.

By using the above assumptions, the material flow targeting on glass bottles and containers in the Philippines at macro scale was developed as illustrated in Figure 2.3.19 below.

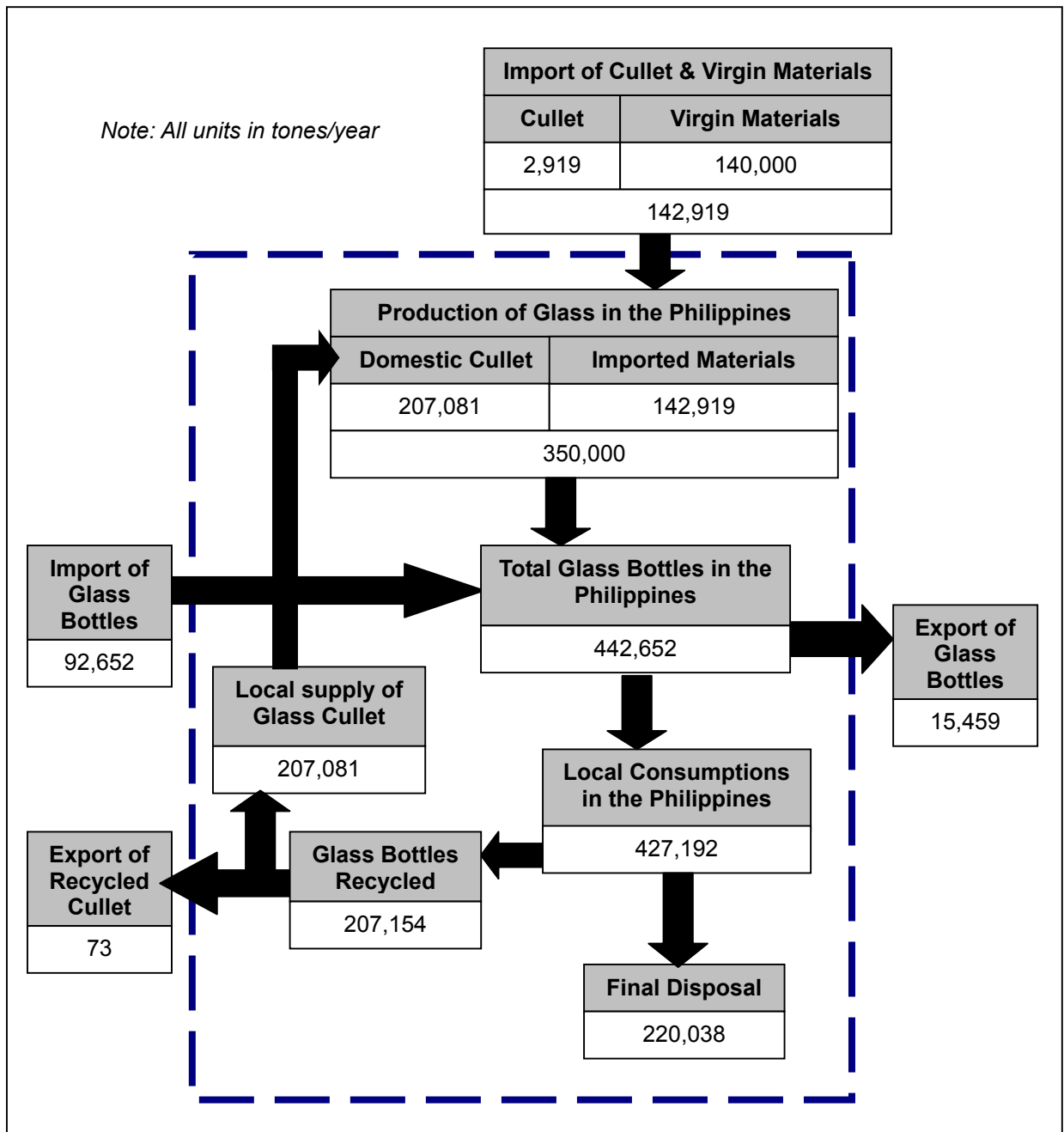


Figure 2.3.19 Material Flow for Glass Bottles in the Philippines at Macro Scale

The total production of glass bottles and containers in the Philippines (350,000 tones/year) was estimated from the data given by San Miguel Yamamura, which is the largest glass bottle and container maker in the Philippines, taking about 80% of the total share of glass and containers in the Philippines at the production capacity of 750 tones/day or 273,750 tones/year. The balance of about 76,250 tones/year of glass bottles and containers are expected to be produced by other smaller glass bottle and container manufacturers.

The production of glass bottles and containers in the Philippines is based on the consumption requirement of 40% of virgin materials and 60% of glass cullet, i.e. 140,000 tones/year of virgin

materials were required for year 2004, which were imported from overseas.

The remaining 210,000 tones/year of glass cullet required for the production was obtained both from overseas as well as local supplies. Based on the import data of DSO for year 2004, only 2,919 tones/year of glass cullet was imported into the Philippines, and based on this figure, it was calculated that about 207,081 tones/year of glass cullet were supplied domestically for year 2004.

About 92,652 tones/year of glass bottles and containers were recorded by DSO to be imported into the Philippines for year 2004, therefore it sums the total glass bottles and containers in the Philippines to about 442,652 tones/year. After deducted the export of 15,459 tones/year also based on data of DSO, the total consumption of glass bottles and containers is estimated to be about 427,192 tones/year in the Philippines.

The DSO export data further supports that a small amount of about 73 tones/year of recycled cullet was exported to overseas mainly to Japan, United Kingdom and Ireland, while the other 207,081 tones/year of glass cullet was expected to supply to the glass production as mentioned before. This has made the total glass recycled in the Philippines to a total of about 207,154 tones/year, or 48.5% recycling rate in overall.

In terms of percentage, it was calculated that the total cullet imported accounted for only 0.8%, while the domestic cullet was dominant at 59.2%, with the other 40% being the virgin materials imported from foreign countries in the form of silica sand, soda ash and limestone.

Based on the estimated population of 87,893,560 for the Philippines in year 2004, it was estimated that the glass bottle and container consumptions in the Philippines for year 2004 was about 4.86 kg/cap/year or 0.013 kg/cap/day.

In comparison with the 5 years data from 2000 to 2004, it was illustrated in Figure 2.3.20 as follows:

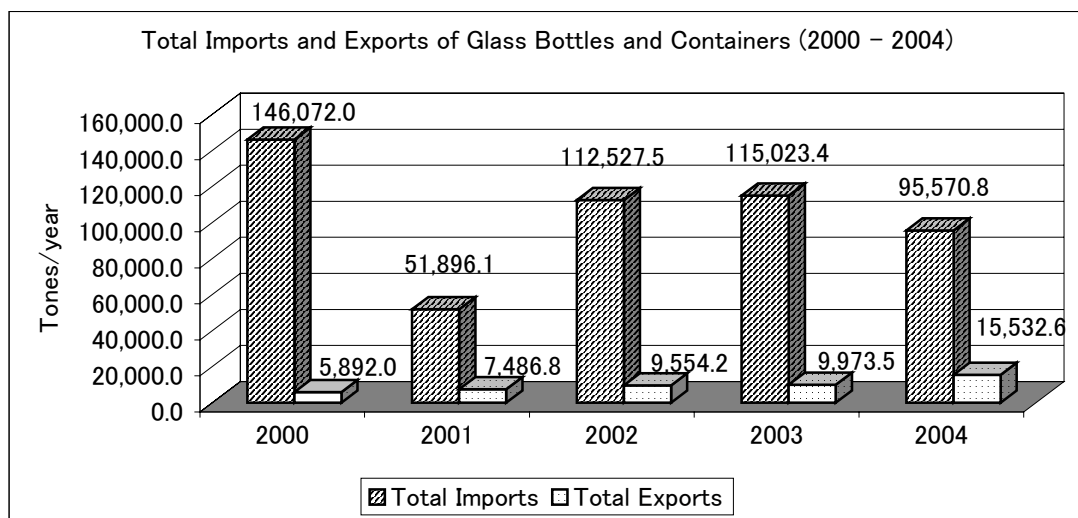


Figure 2.3.20 Total Export and import for Glass Bottles and Containers (2000-2004)

Based on data of 2004, the cullet imported to the Philippines was mainly from China (88%), followed by Japan (10.9%) and some other countries as shown in Figure 2.3.21.

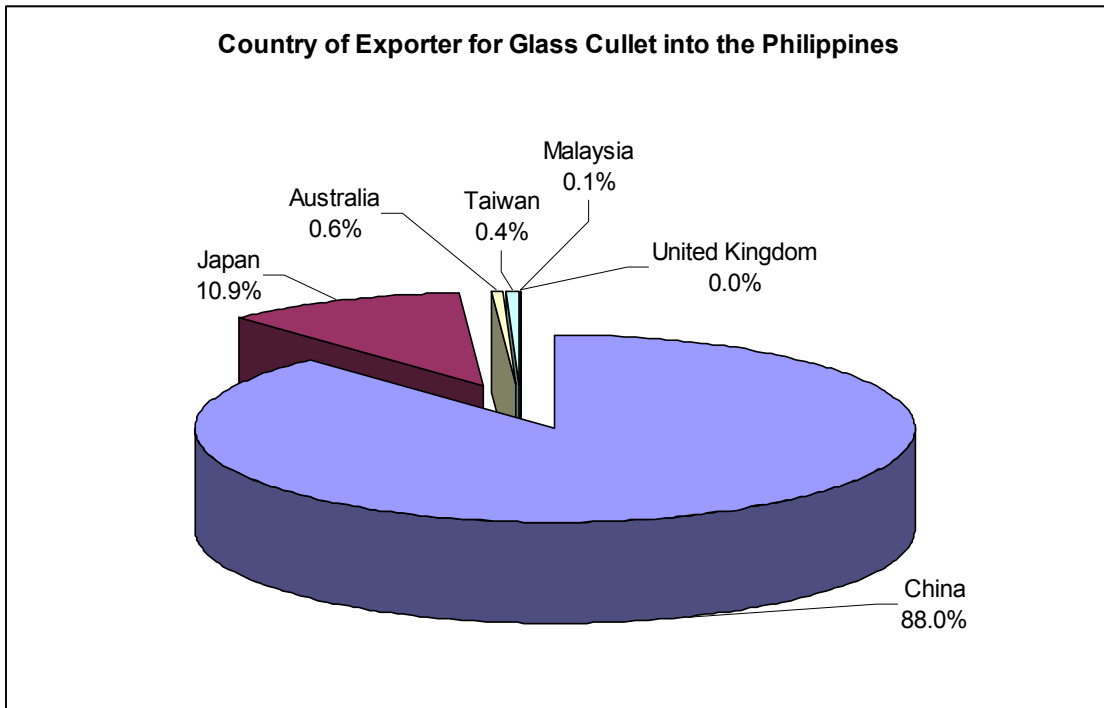


Figure 2.3.21 Country of Imports of Glass Cullet from the Philippines (2004)

On the other hand, out of the very small amount of glass cullet exported from the Philippines, almost all were exported to Japan (99.8%) while the remaining 0.2% was exported to the United Kingdom.

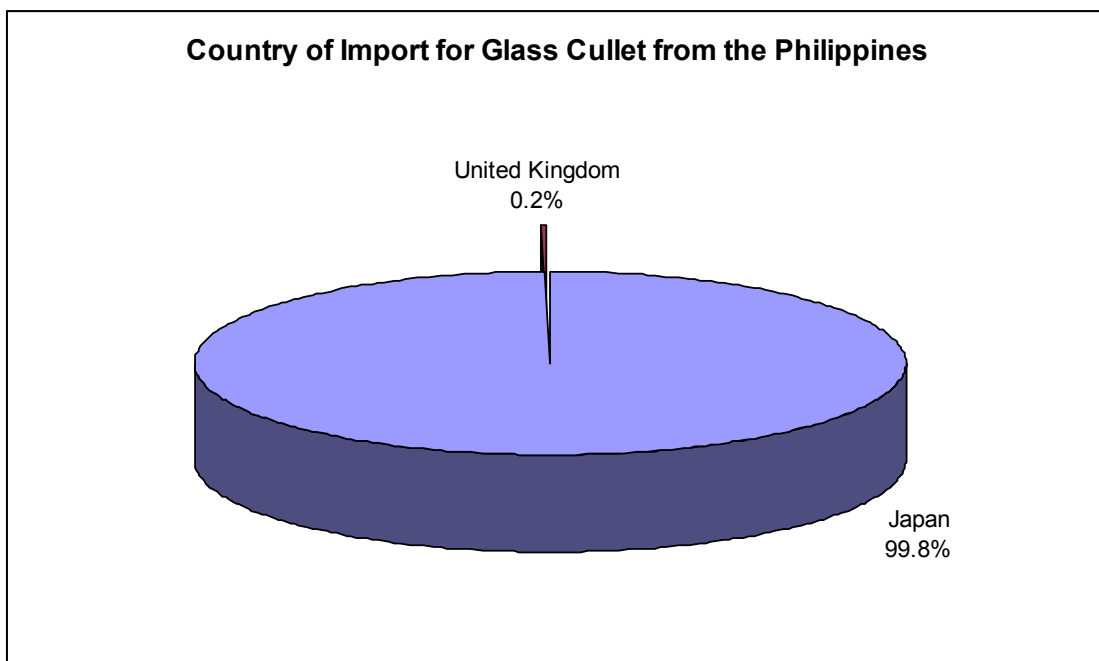


Figure 2.3.22 Country of Imports of Glass Cullet from the Philippines (2004)

2.3.6 Used Electric/Electronic Home Appliances

(1) Importers and Consumers

Goods entering the Philippines through the various international ports are described in the Bill of Lading document accomplished by the exporter of these goods from their country of origin. This document, aside from containing information on the shipping company and the consignee, also states the goods' HS Code (Harmonized System Code), their weight, estimated value, and general description. This information is verified by the Bureau of Customs (BOC) and goods are appraised for the appropriate duties and taxes prior to release from the container port area. Importation data from the BOC and the Bureau of Importation Services (BIS) are based on these documents, and admittedly not all contents of container vans/ shipments can be determined if brand new or used just by going through the database, since some surplus or secondhand items might come in declared as personal effects. Another aspect to consider is that less duties and taxes are paid for goods that are declared as surplus/ secondhand. Thus there is also a possibility of mis-declaring goods as secondhand. This is avoided by thorough ocular inspection of the container's contents – brand new items are carefully packaged and are usually ordered in bulk, i.e. 2-3 containers of the same kind.

For electric and electronic appliances, brand-new and second-hand items are not differentiated in the HS Coding System – only automobiles and motorbikes have different codes for brand-new and secondhand ones – so unless the exporter describes these as “used” or “secondhand,” the BOC and BIS database would not reflect this. While items with unit values much lower than the average market price can be deduced as surplus or secondhand, these were not included in the finalized importation data presented in this report.

Table 2.3.9 shows processed data provided by the Management Information System and Technology Group of the Bureau of Customs, which covers 2004-2006 importations of surplus E-items and cell phone batteries according to their countries of origin. Meanwhile, Table 2.3.10 presents data also showing countries of origin obtained from the Bureau of Importation Services during a previous study conducted by SAGIP Environment covering 2002-2005 importations, with partial 2006 data. BIS data focused on declared surplus televisions, refrigerators and personal computer units/parts and did not include cell phone battery importation.

Table 2.3.9 BOC Importation Data (Volume and Value) by Country of Origin, 2004-2006

Country of Origin	Volume (kgs)	Country %	Value (PhP)	Country %
Surplus Televisions				
Australia	109,705	0.61	2,736,046	1.65
Japan	11,234,844	62.49	87,498,263	52.70
Korea	6,580,869	36.60	75,023,404	45.19
USA	36,111	0.20	621,422	0.37
Others	17,280	0.10	146,013	0.09
TOTAL	17,978,809	100.00	166,025,148	100.00

Country of Origin	Volume (kgs)	Country %	Value (PhP)	Country %
Surplus Refrigerators				
Australia	77,952	3.90	1,832,878	5.12
Japan	1,531,315	76.53	19,944,646	55.68
Korea	224,128	11.20	4,250,015	11.86
Singapore	33,635	1.68	276,148	0.77
Taiwan	34,054	1.70	984,588	2.75
Thailand	49,572	2.48	6,897,966	19.26
USA	45,972	2.30	784,737	2.19
Others	4,243	0.21	849,301	2.37
TOTAL	2,000,871	100.00	35,820,279	100.00
Surplus Personal Computer Units and Parts				
Australia	38,583	7.15	5,907,344	26.66
Canada	5,680	1.05	802,663	3.62
Japan	220,446	40.84	4,619,182	20.85
Korea	228,796	42.39	5,662,766	25.56
Singapore	8,818	1.63	860,142	3.88
USA	35,457	6.57	3,151,111	14.22
Others	1,979	0.37	1,151,831	5.20
TOTAL	539,759	100.00	22,155,039	100.00
Brand New Cell Phone Batteries				
Hong Kong	514		232,788	
Japan	475		244,541,162	
China	???		???	
Taiwan	???		???	

Table 2.3.10 BIS Importation Data (Volume) by Country of Origin, 2002-2006

Country of Origin	TVs	%TVs	Refs	%Refs	PCs	%PCs	TOTAL	% Country
	Volume (kgs)		Volume (kgs)		Volume (kgs)			
Australia	59,485	0.177	3,324	0.317	503,242	17.841	566,051	1.512
Canada					36,175	1.282	36,175	0.097
China	410	0.001	70	0.007	41,450	1.469	41,930	0.112
Great Britain					1,353	0.048	1,353	0.004
Guam	140	0.000					140	0.000
Hong Kong	48,851	0.146	970	0.093	77,538	2.749	127,359	0.340
Italy			150	0.014			150	0.000
Japan	18,532,238	55.200	800,455	76.427	266,285	9.440	19,598,978	52.346
Korea	14,135,540	42.104	99,365	9.487	1,586,481	56.243	15,821,386	42.257
Malaysia	38,435	0.114	496	0.047	6,786	0.241	45,717	0.122
Pakistan	160						160	0.000
Singapore	17,273	0.051			125	0.004	17,398	0.046
Spain			145	0.014			145	0.000
Taiwan	696,931	2.076	119,935	11.451	1,609	0.057	818,475	2.186
USA	43,516	0.130	22,235	2.123	297,676	10.553	363,427	0.971
Vietnam			200	0.019	2,050	0.073	2,250	0.006
Total	33,572,979		1,047,345		2,820,770		37,441,094	100
% E-item	89.669		2.797		7.534		100	

Based on importation data from the BOC and BIS, surplus television sets from Japan and South Korea comprise about 97%. For refrigerators, Japan tops in both datasets as the primary source, with Taiwan, South Korea, Australia and the United States as other sources. Thailand is also in the

top five due to a large shipment of used refrigerators registered in 2002 BOC data. As for computers, the BOC 2004-2006 data ranks Australia as the primary source at 26%, with South Korea at a close second at 25%. However, considering importation volume over the past four years from the BIS data, South Korea contributed 56% of surplus computer units and parts. Both data sets rank South Korea, Australia, USA and Japan as main sources for surplus PCs. Figure 2.3.23 illustrates the main sources of the combined volume of target surplus e-items with Japan and South Korea contributing 53% and 43%, respectively. In terms of importation according to e-item, almost 9 out of 10 surplus items are televisions (Figure 2.3.24). Both pie charts are based on BIS data.

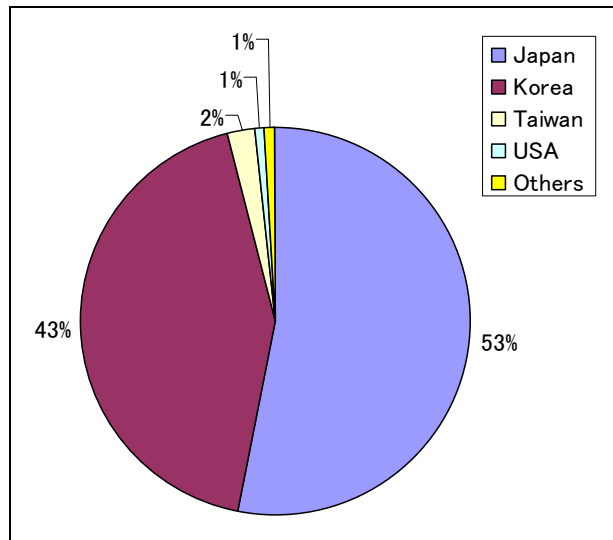


Figure 2.3.23 Importation Volume of Surplus E-items per Country of Origin

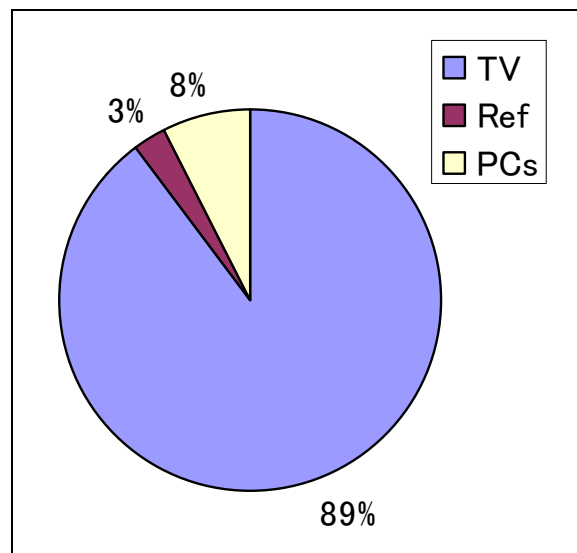


Figure 2.3.24 Importation Volume of Surplus E-items by Type

BIS data were also processed to determine the flow of E-goods according to ports of entry. Figure 2.3.25 illustrates the inflow and domestic distribution of surplus items in general. The international ports of Manila, namely the Manila International Container Terminal (MICT) and the Manila South

Harbor, receive 84% of the total volume of electronic surplus entering the country, which are distributed to the various trade centers in Luzon, Visayas and Mindanao. Davao is a far second in terms of direct importation at 13%, and a few enter via Cebu and Cagayan de Oro. The volume of electronic surplus entering other ports is minimal. For Batangas, virtually all surplus E-items are sourced from Manila. A small number of surplus PCs also enter via Subic.

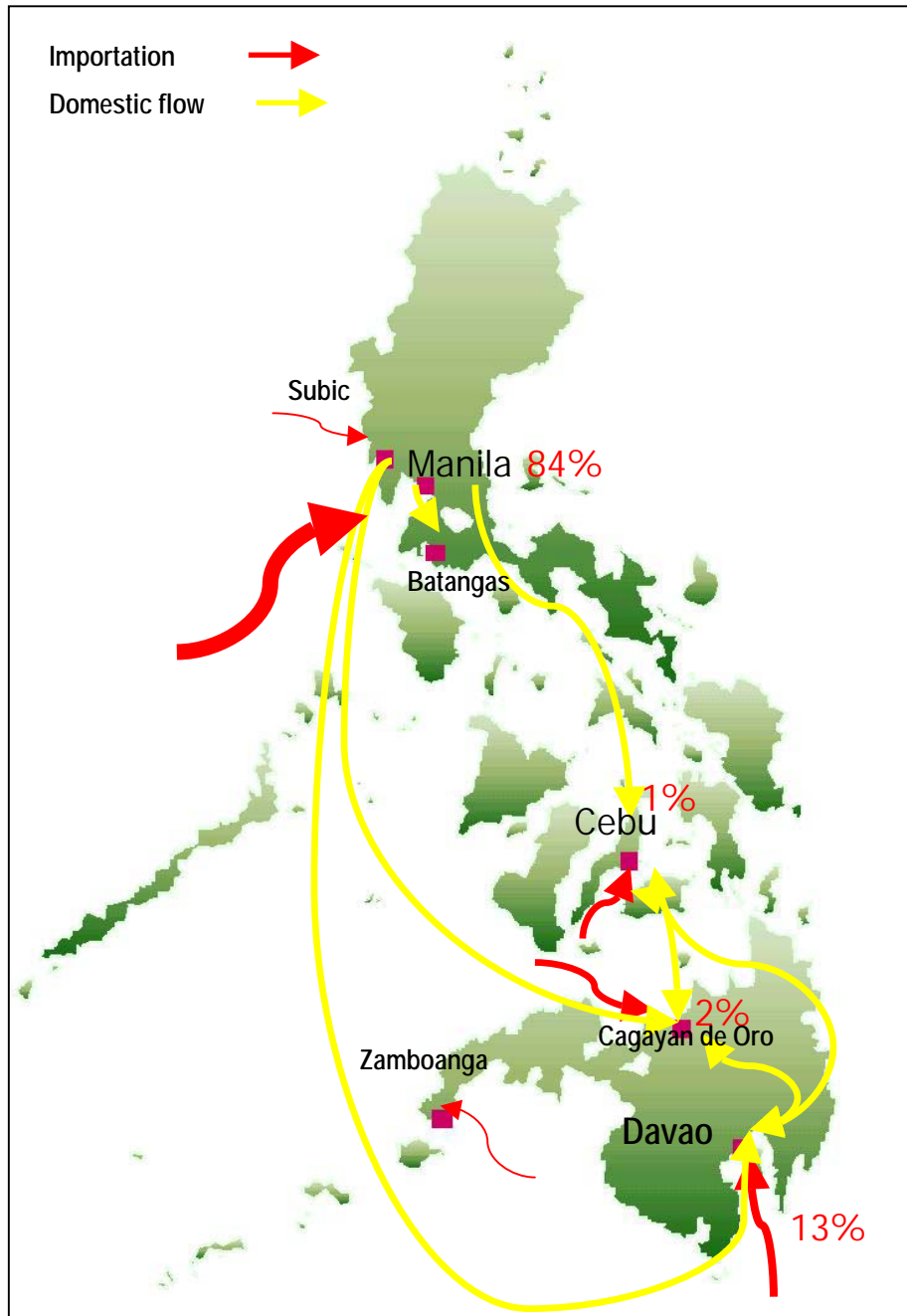


Figure 2.3.25 Flow of Imported E-Surplus into and within the Philippines

Table 2.3.11 differentiates the entry of electronic items in the major ports according to type. As expected, Manila receives 83% of TVs, 93% of refrigerators and 89% of PCs. For televisions, Mindanao receives about 16% entering via Davao and Cagayan de Oro. As for personal computers,

Cagayan de Oro receives more units at about 7% compared to Cebu (4%) and Davao's negligible 0.45%. In fact, some computer E-shops in Cebu are franchises whose main offices are in Cagayan de Oro. This city could be a potential study site for the entry of computers into the Visayas-Mindanao area.

Table 2.3.11 Importation Volume by Port of Entry, 2002-2006

Port Areas	Port Codes	Surplus Item		
		TV%	Ref%	PCs%
Luzon				
Manila	PO2A, PO2B	83.44	93.11	89.12
Subic	PO13	0.00	0.05	0.41
Batangas	PO3			0.01
Visayas				
Cebu	PO7, PO7B	0.64	1.16	3.14
Mindanao				
Zamboanga	PO10	0.01		
Cagayan de Oro	PO11	2.05		6.87
Davao	PO12	13.87	5.67	0.45

1) Importation of Surplus Appliances and Computers

a Major dealers

As can be surmised from the importation data, major surplus dealers are based in Metro Manila. A key player would be HMR Philippines Inc., part of the international HMR group that started in the 1980's in Melbourne, Australia, which also operates California and Malaysia. A sister company, HMR Envirocycle, is one of the primary recyclers and exporters of electronic waste in the country. Other members of the HMR Group include Save on Surplus (dealers of secondhand computers with 39 branches nationwide) and Five Jays (the major surplus dealer in Metro Cebu). Most of these items are sourced from Australia and the United States. The founders of Uniz Econo, a newly formed company, also have connections with HMR and SOS. Uniz Econo imports surplus CD/cassette players assembled in China and carrying an American brand name (J-Win). These units are excess items from US government offices and are shipped from California. As for surplus computer units and parts, Uniz Econo has a South Korean supplier. While it would be difficult to establish how much of the market is dominated by HMR and its sister companies, consolidated data from their network would be substantial in the analysis of the surplus electronic appliance industry in the Philippines.

For surplus PCs, aside from HMR Philippines (which also covers SOS), there is Discovery Mall, which is owned by a Chinese businessman based in Binondo and has four branches, and Save a Lot Surplus in Raon, which owned by a Korean. Discovery Mall and Save a Lot carry US/ Australia and South Korean surplus PCs, respectively.

b Nature and frequency of shipments

The frequency of electronic surplus shipments varies considerably; it could be monthly to quarterly, especially for most small players. Surplus importers usually have limited control of the nature and quality of items for each delivery; containers arrive carrying mixed items that vary for each shipment. Two-thirds of the items would need minor repairs, and completely defective items could be as high as 30% of the shipment.

For TVs and refrigerators, all the items in a container can be received by one consignee that has its own surplus shop, but usually the contents are divided among several dealers. Under this set-up, there is a considerable risk that one dealer would receive all the defective items, since these can only be checked after distribution/ upon arrival at the shop or warehouse.

c Consumption patterns

A student paper on electronic waste from the University of the Philippines' Environmental Engineering program used consumption patterns and life cycle data analysis to project the volume of electronic waste that will accumulate in the next years. Data from the Family Income and Expenditure Survey (FIES) of the National Statistics Office (2000) were processed mathematically, taking into consideration access to electricity, acquisition periods, sales, product lifetime and probability of disposal. The scenario using baseline end of life at 5 years show that by 2010, more than 24 million units of electronic appliances would have been accumulated in the country over the past ten years.

Households having more than one television are more prevalent in Metro Manila than in other urban areas included in this study. Surplus TVs and refrigerators are more common and less expensive in Manila compared to Batangas, Cebu or Davao. Generous installment packages prevalent in Cebu and Davao allow more households to acquire brand new appliances. For computer surplus shops, the most popular item would be branded secondhand monitors, owing to the perception that branded monitors are more durable, compared to more expensive brand new items made in China or Taiwan. The high turnover of surplus computer monitors could also be attributed to the current proliferation of internet/gaming shops, wherein vivid and bright colors given by CRT monitors are preferred. As for peripherals such as keyboards and mouse, consumers prefer to purchase brand new China-made units, which are actually cheaper than their surplus equivalents from Australia and the US. CD-R King, a company that started as a wholesaler of inexpensive recordable compact disks, has grown to 50 branches nationwide over the past two years and has expanded their market to other peripherals. These PC parts and accessories are made in China and carry the CD-R King brand name.

2) Importation of Cell Phone Batteries

The data obtained from the BOC on cell phone batteries seems insufficient considering the huge local market. About 32 million subscribers (roughly 40% of the population) were estimated by the end of 2004. BOC data also listed Japan and Hong Kong as primary sources; however, this does

not reflect the abundance of China-made batteries being sold in E-shops.

Information and insights on cell phone battery importation in this section were provided by a buyer head of a major importer and need further verification. According to the buyer head, who requested anonymity, there is no such thing as importation of “secondhand cell phone batteries,” a target E-item in the SCR Questionnaire Survey. It is possible that refurbished secondhand mobile phones are imported, but these are equipped with new batteries. Their company dominates about 40% of the market of Class B-C batteries, with about 69 branches/ distributors, about 40 of which carry their name or are individual retailers (29). They have branches in Cebu, and used to have a branch in Davao, which closed due to reduced sales in light of the peace and order situation in the area (cell phones being used in bombing incidents).

a Sources and standards

According to this informant, almost all cell phone batteries that enter the Philippines are manufactured in China. In some cases, parts or materials may come from Japan, but are assembled in China. Supplies that come from Taiwan are also produced in China. Unlike with other products that enter the Philippines, cell phone batteries do not undergo rigid testing or procedures in terms of quality and consumer standards. Quality standards are usually set by the importers themselves – if they are conscientious, they would set higher standards. For this particular company, batteries should be compatible with 220-V chargers, and should not be of the Nickel-Cadmium (Ni-Cd) type. Some importers, however, may not practice product screening, and are not selective against Ni-Cd batteries.

Defective batteries can be sent back to China within 6 months for replacement. Their franchises and distributors in other parts of the country can return these defective batteries to the main office in Manila, which in turn sends it back to the supplier in China which handles freight costs. They average 20 kg (about one box) in one month, which includes returned units from franchises. However, batteries of obsolete cell phone models that are out of warranty are no longer sent back. Defective battery chargers sell for PhP10/kg, while depleted batteries are sold to local junkshops at PhP3/ kg.

b Types of batteries

Various kinds of batteries are available in the local market. Batteries are differentiated whether they are “original” or “Class A/B/C/D.” They can also be classified according to the material used, which dictates selling price. Nickel-metal hydride (Ni-MH) batteries are the most expensive, with peak use for 1,000 recharge cycles (about 2-3 years), 5 hour continuous talk time and 5 days standby time. Even with depleted of charge, Ni-MH batteries will not be damaged. On the other hand, Li-ion or Li-polymer batteries also provide lengthy standby time, these cannot be jump-shocked and their charge should not be depleted. Ni-Cd batteries are the most affordable – with production cost in China equivalent to around PhP 15 and are sold in the Philippines for PhP 150. These battery types are summarized in Table 2.3.12.

Table 2.3.12 Various Types of Cell Phone Batteries in the Philippines

Type	Brands	Source	Materials	Selling Price
Original	Nokia, Sony Ericsson etc	Asia-based accredited manufacturer	Ni-MH	PhP 1,900
Class A	i.e. OEM	Usu. China	Ni-MH	PhP 900
Class B	i.e. OEM		Li-Ion, Li-polymer	~PhP 400
Class C	Numerous brands		Ni-Cad	150 – 200
Class D				100 or less

c Consumption

Authorized dealers of popular mobile phones (i.e. Nokia) import batteries for after-sales services and not for selling as a primary product. These would usually be original or Class A batteries, which would cost PhP 900 or more. These dealers, such as Semicon, Access Global and Bright Point, can be found in selected shops or high-end malls (1st level consumers). On the other hand, there are numerous importers of cell phone batteries and other accessories as primary products, which include Armor, Lobra, Wellcom, and H&K. Some of these importers such as Power Cel are either based in the Binondo area, or owned by Chinese businessmen.

Generally, a major importer of Class A batteries (used for after-sales services and not sold as a separate item) averages 9,000 units/month; 4,000 of which would be for Nokia phones. For Class B-C batteries sold to distributors and franchises nationwide, about 15,000 units/ month of mostly Nokia batteries would be imported.

Small shops or stalls found in most malls for 2nd – 3rd level consumers would most likely carry Class B-D batteries which would cost PhP 400 or less. However buyers generally think that batteries that cost around PhP 400 are “original”, and that Class A batteries would be those that sell for around P200, a notion that is carried by the sales clerks themselves.

The ordinary Filipino consumer cannot afford original batteries, which cost almost the same as a low-end mobile phone, hence the proliferation of cheaper alternatives. There are also imitation Nokia batteries or even imitation Class A batteries that are being sold with a maximum life of one year. These imitation batteries usually do not possess capacitors that control charging hence possess a higher risk of exploding. While labels indicate that they are made of Ni-MH or other materials, these might actually contain Ni-Cd, if their selling price is any indication. Last September of this year, there has been an incident of a fire caused by recharging a low-quality battery sold at sidewalks for PhP 50 (news).

(2) Port Areas and E-shops

Most ports are under the jurisdiction of the Philippine Ports Authority (PPA), while the Cebu International Port under the Cebu Ports Authority (CPA). Goods are received by importers as represented by their brokers, which oversee paperwork and inspection of the container vans. These vans are opened and inspected in the presence of a customs examiner, which verifies the information

in the Bill of Lading shipping document, after which another customs representative appraises the shipment for the appropriate duties and taxes. After the necessary clearance papers are secured, container vans are released and transported to various destinations - one might be distributed to individual dealers, one might be assigned to a local distributor for pick-up, another might be delivered directly to the main warehouse or company office.

1) Metro Manila

Metro Manila can be considered the main entry point of imported surplus electronic and electrical appliances, with two major container port areas – the Manila International Container Terminal or MICT, and Piers 3 and 5 of the Manila South Harbor, both of which are managed by Asian Terminals, Inc. (ATI). Consistent with its status as the major economic center in the country, various hubs for trade of E-items can be found within the thirteen cities and four municipalities that comprise this metropolitan area. Figure 2.3.26 illustrates the geographical distribution of these hubs, as well as the location of the combined respondents of the SCRS questionnaire and component flow surveys, while Figure 2.3.27 shows a general satellite map of downtown Manila with respect to the location of the ports.

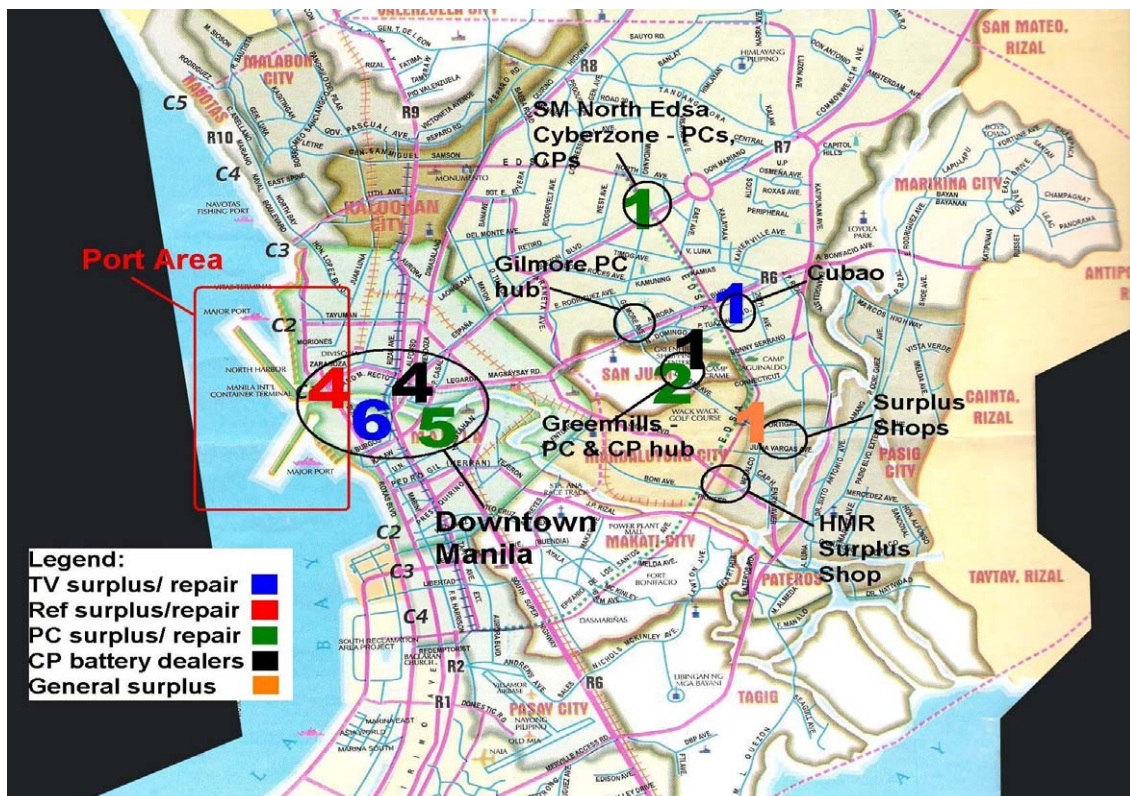


Figure 2.3.26 Distribution of E-hubs and Respondents, Metro Manila



Figure 2.3.27 Port Areas and Downtown Manila

a Port Area

There is a high density of E-shops in the City of Manila, particularly in the vicinities near the ports. For instance, surplus appliance shops are mostly found right outside the Manila South Harbor port area, with about 50 stalls for TVs, 30 for refrigerators/ air-conditioners, and 10 for sewing machines. While it may be inferred that this high density of surplus shops may be due to proximity to the container area, some shops claim that warehouses are located in Malabon, Metro Manila, or Bulacan. One informant shared that in the past, surplus appliances did not arrive in containers but as individual units, and distribution of these goods to the E-shops would occur in the vicinity of the port. Due to stricter regulations, distribution now occurs elsewhere; however since customers traditionally frequent the port area for cheap appliances, the E-shops did not relocate anymore. Also, there are instances when the containers are opened along side streets just outside the port area, the contents of which are divided and distributed to the nearby e-shops. It is possible though that a number of surplus appliances find their way to these E-shops directly from the container area, due to lapses in security.

b General trade situation

Stalls owned or operated by Muslim dealers are common in the port area; however, it cannot be concluded that this group has a monopoly of trade. The major dealers in the port area are said to be a Filipino-Japanese couple, an Indian trader, and a Filipino Muslim. The contents of one container are usually divided among two to three shops without prior testing. Since about 10-30% of the contents are usually defective or irreparable, there is a risk that one shop would receive most of the

malfunctioning items. Bulk deliveries are made by jeepneys, while carts and pedicabs shuttle small quantities of working appliances to be sold. E-shops in the Port Area double as repair centers, and newly-arrived appliances are tested and repaired or refurbished on-site.

c Other E-hubs in Manila

The Raon Area near Quiapo, Manila is a well-known district where one can purchase low-priced electronic parts and equipment such as electrical home appliances, personal computers, digital cameras, DVD players, sound systems, and others. Many of these items are also imported surplus or carry less-known brands, usually from China, Taiwan or South Korea. Some of these stalls have main offices in the port area, while some are being supplied by major importers with direct links to suppliers in mainland Asia, Japan and Taiwan.

C.M. Recto Avenue, which hosts several educational institutions, is also known for bargain school supplies and used books. The Recto area is also famous (or infamous) for cell phone units and accessories sold at very low prices, some of which are of dubious origin since there are numerous cases of pick-pocketing in the area. Of the respondents for cell phone battery shops, those in Recto carry the lowest price. While there are a limited number of E-surplus shops in the Chinese business district of Binondo, many importers and traders have their main offices there, such as Discovery Mall, which sells surplus personal computers. Figure 2.3.28 and Figure 2.3.29 give a closer look at the E-shops in the Port Area and downtown Manila.

d E-hubs across Metro Manila

Before the recent renovation of the Viramall complex in San Juan, it was known to cater to low-income consumers of cell phones and accessories, personal computers, VCD/DVD players, and others. Many of these cell phones are refurbished or domestic secondhand units. PCs are generic assembled/ reconditioned units or of less-known brands. The new V-mall building still hosts several E-shops, while the adjacent Greenhills Shopping Center devotes most of the second floor to stalls of cell phone units, accessories and repair. Currently the most popular hub for personal computers is the Gilmore IT Center at the corner of Gilmore Street and Aurora Avenue in Quezon City.

Other E-shop hubs are scattered across commercial centers and malls in Metro Manila. Several SM Malls have a Cyberzone, a section where e-shops are concentrated. Of the 98 stores in the SM North Edsa Cyberzone, 43 are computer and electronics shops, 22 are cell phones/ accessories shops, and one is an appliance center. Most common are cell phone shops, which are most easy to franchise and set-up given the small capital and rental space needed. Low-end malls such as Ever Gotesco Commonwealth and St. Francis Square could have at least 30 stalls in one floor.



Figure 2.3.28 E-shops in Port Area, Manila South Harbor



Figure 2.3.29 Raon, Recto, Binondo and Quiapo Areas, Manila

e Disposal

E-shops in the Port Area and other hubs in downtown Manila double as repair centers. Parts and scraps are sold to individual junk collectors who frequent the area. Sometimes non-functional units are carried off in carts and pedicabs for disassembly and retrieval of parts. Common items bought by these collectors would be hard plastic or metal casings, copper wires and other electrical wires. As for picture tubes in TVs and monitors, they also sell to neighborhood junkshops, some of which break the glass off without protective gear or machinery. This is sometimes done in the stalls as well, since glass shards can be sold per kg and are possibly mixed with other cutlets. There is also no proper disposal for non-functional LCD screens for used laptops and other parts that cannot be reused.

Unlike the relatively open-access electronic centers in Manila frequented by junk collectors, E-shops in malls conform to the disposal methods of the commercial complex unless their main office receives non-working units or parts for storage. Usually in these malls, segregation of E-waste is minimal. None of the respondents practice generalized or bulk disposal system for cell phone batteries other than storage or disposal with municipal waste.

2) Batangas City

a Port Area

Unlike in the vicinity of the MICT Port Area in Manila, there are no surplus shops located outside or near the Batangas Port.

b General trade situation

There is no monopoly of the electronics/ electrical appliances industry in Batangas City as it is observed that different E-shops are separate business entities and have different owners. As illustrated in Figure 2.3.30, surplus TVs shops and cell phone battery shops are concentrated in the Poblacion area (downtown), while there is no apparent hub for surplus PC shops. There was no observed surplus shop for refrigerators, though local repair shops can be found.

c Downtown E-shops

Almost all E-shops in Batangas City source their surplus products from warehouses that are located in Manila. Their merchandise is either sent to Batangas City after entry at the Manila South Harbor, or their Manila-based supplier has a branch in Batangas. TVs and PC shops in Batangas City are usually branches of nationwide dealers. For instance, Orange PC used to be a branch of Save on Surplus until recently when they stopped carrying US and Australia computer surplus and concentrated on South Korean brands. Delivery could occur at least weekly, depending on the supplies needed by the store. Transportation of goods can be more frequent than this since Manila is just 2 1/2 hours away from Batangas City, hence shops can order as needed. Unit prices of bought goods are usually unknown to the respondents because the goods are just delivered in the

store. Interviewees either did not have personal knowledge of how much the goods were bought, or were hesitant to divulge financial information.

Cell phone battery shops are mostly small-scale retailers, with majority of stall owners being members of the Muslim community. These shops operate as informal cooperatives, in which they take turns in wholesale purchasing from dealers in the Recto area in Manila. Aside from selling and repair of phone units, these stalls also retail batteries and other phone accessories. Only one shop was observed to exclusively sell CP batteries, however this shop declined to be a respondent. Most of them are very small entities that can be considered as sidewalk vendors.

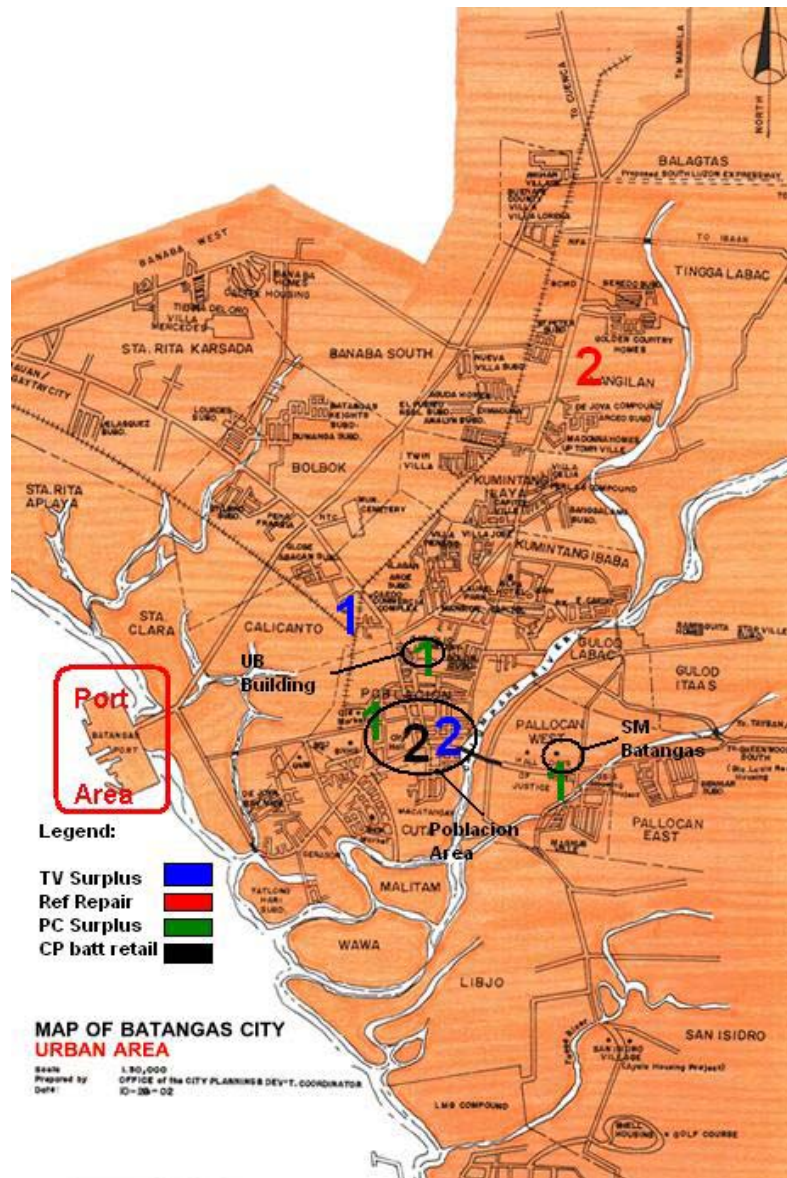


Figure 2.3.30 Distribution of Respondents, Batangas City

d Disposal

Most surplus TVs and PCs are tested if they are in good working condition prior to delivery to the Batangas branch; defective units are returned to their supplier or warehouse for repair or disposal. PC repair shops usually return the replaced part to walk-in customers as the owner claims his repaired or upgraded unit. In general, there is minimal waste retained in the shop. Selling of electronic junk is not common, and the main disposal method is via collection of waste by the municipal government.

(3) Metro Cebu

Metro Cebu is the gateway for East and Western Visayas and a hub leading to Mindanao. However, E-shops in Cebu City and adjacent areas usually have suppliers located in Metro Manila or in major cities in Mindanao such as Cagayan de Oro.

a Port Area

The Port Area extends from Cebu City to Mandaue City. The Cebu International Port and major inter-island piers (Supercat, WG&A Shipping, Gothong, etc.) are also located in Cebu City. Unlike Metro Manila where the Port Area is identified as a trading hub for various electronic items being studied, there is no equivalent area found in the Port Area of Metro Cebu. What are found in the Cebu Port Area are used heavy trucks and machineries dealerships as well as warehouses of big businesses. Five Jays, an affiliate of the HMR Group of Companies, is located just outside Pier 2. This is the only surplus outlet located within the port area.

b Downtown E-shops

Electronic shops surveyed are spread over four cities for the province of Cebu. Metro Cebu is composed of three cities, namely Cebu, Mandaue and Lapu-Lapu, while the satellite city of Talisay was also surveyed. There were a total of seven shops located in various places of Cebu City. Two shops are located in Mandaue City and one shop located in Lapu-Lapu City. One computer shop is located in Talisay City. There is no specific hub for second hand/surplus electronic items located in Metro Cebu and its satellite areas.

Secondhand/surplus electronic shops are widely dispersed through out the metropolis. According to the enumerators who conducted the survey, electronic items are sent from the warehouse directly to the different branches located in various parts of Metro Cebu. Figure 2.3.31 shows the location of general surplus dealers (nos. 1-3), surplus TV dealers (nos. 4-5), refrigerator shops (nos. 6-7), PC shops (nos. 8-9) and cell phone battery shops (nos. 11-14). The port area is enclosed in the red rectangle.

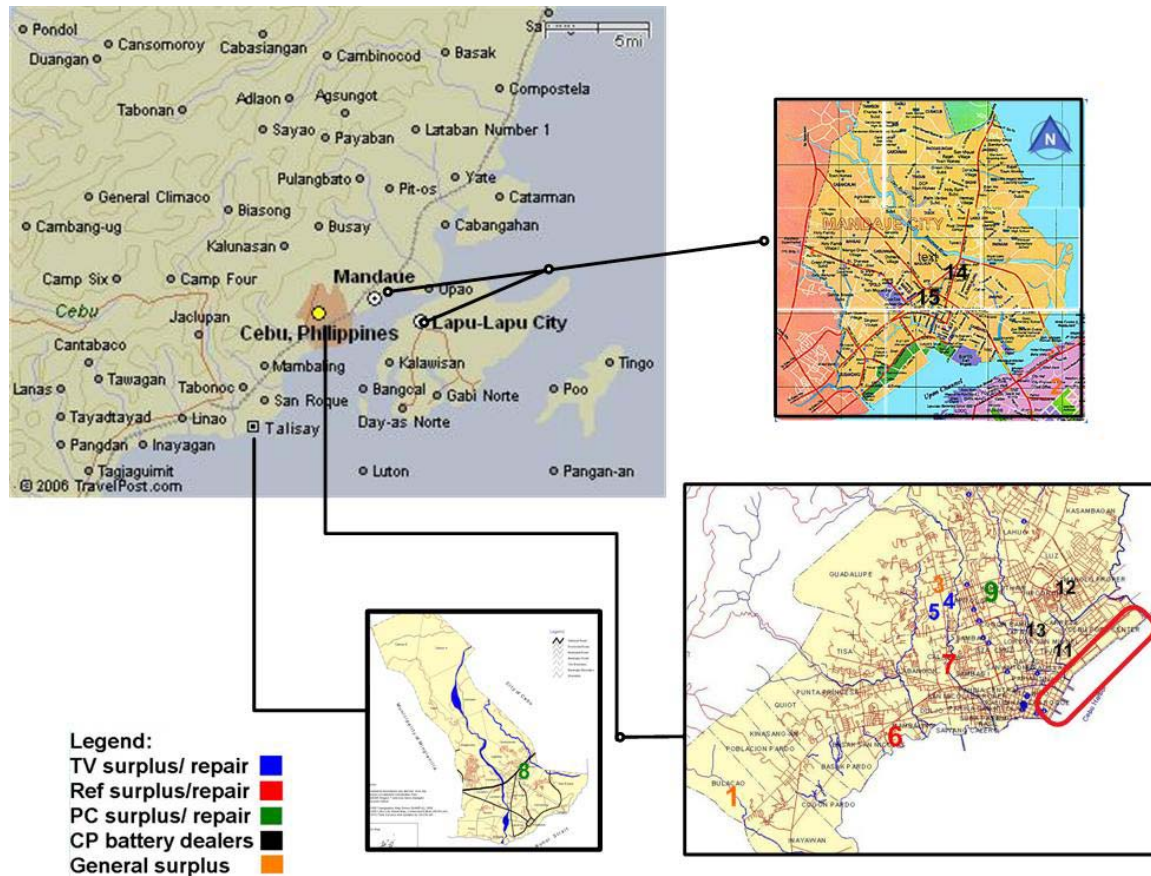


Figure 2.3.31 Distribution of Respondents, Metro Cebu

c General trade situation

Based on an ocular survey of Metro Cebu, there are more appliance shops selling brand new TVs, refrigerators, and computers and its peripherals (though the brands may not be as well known) than secondhand/surplus stores. According to a Cebu resident who rents out commercial space in Carcar, most prefer to buy brand new appliances because of the generous and more manageable installment terms being given to prospective customers, vis-à-vis one-time payments for a surplus appliance. This is aside from the inherent bias for buying new appliances in general. This consumption pattern may explain why secondhand/surplus shops are not as numerous as brand new appliance stores located within Metro Cebu and in satellite towns like Carcar.

This is not true for cell phone shops, which are very numerous not only in Metro Cebu but also in Carcar and other suburban municipalities. Cell phone users generally prefer cheaper alternatives to original branded phone units and peripherals like batteries and chargers. There is a big difference in cost in so-called original batteries which cost PhP 640 each while those sold as “Class A” batteries only cost around PhP 170. In an informal interview with an authorized sales agent of Smart cell phones and peripherals in Carcar, they have stopped carrying original batteries because of lack of sales due to higher cost. They have also stopped selling “Class A” batteries because of high return rates due to defectives.

In a briefing with enumerators, they recounted that certain individuals make the rounds to cell phone shops buying old batteries for PhP 3-5 each. The enumerators surmised that these might be the batteries being sold for only PhP 20 per in sidewalks.

d Disposal

As noted in the key informant interviews, electronic shops would generally maximize the value of defective electronic items by either using as spare parts components which can be used to fix other units or sell unusable components to junkshops that are willing to buy these components. Throwing or giving these unusable components to the city waste or garbage collectors is done as a last resort since this does not give the shop any financial return.

According to a key informant of a used/surplus TV shop (J&K Trading), defective picture tubes are transported by sea to the main office in Cagayan de Oro City in Mindanao for disposal. They did not, however, elaborate on the procedures in the handling of picture tubes during transport, which poses concern, as these are hazardous materials, nor did they give details on the disposal method employed by the main office. For other E-shops, the general practice is that defective parts are returned to the customers in cases where the electronic item is being fixed by the shop. Customers generally would ask for the defective component to be given back to them.

In the case of cell phone batteries, defective batteries are generally being disposed by giving it to garbage collectors, or burying it in the ground as admitted by one respondent. Though it was mentioned informally that there were individuals buying old/used cell phone batteries, the purpose might be more fraudulent like repacking and reselling these batteries as new.

2) Davao City

a Port Area and Downtown E-shops

As with Batangas City and Metro Cebu, there were no E-shops found in the port area of Davao. Warehouses of importers, which are also wholesalers, retailers and repairers, are widely dispersed throughout the city. Most of these importers have showrooms located in the downtown area. There were no trading hubs for various secondhand electronic and electrical appliances, unlike in Metro Manila. Cell phone shops however are mostly located inside shopping malls. Figure 2.3.32 shows the location of the port area and distribution of respondents in Davao City.

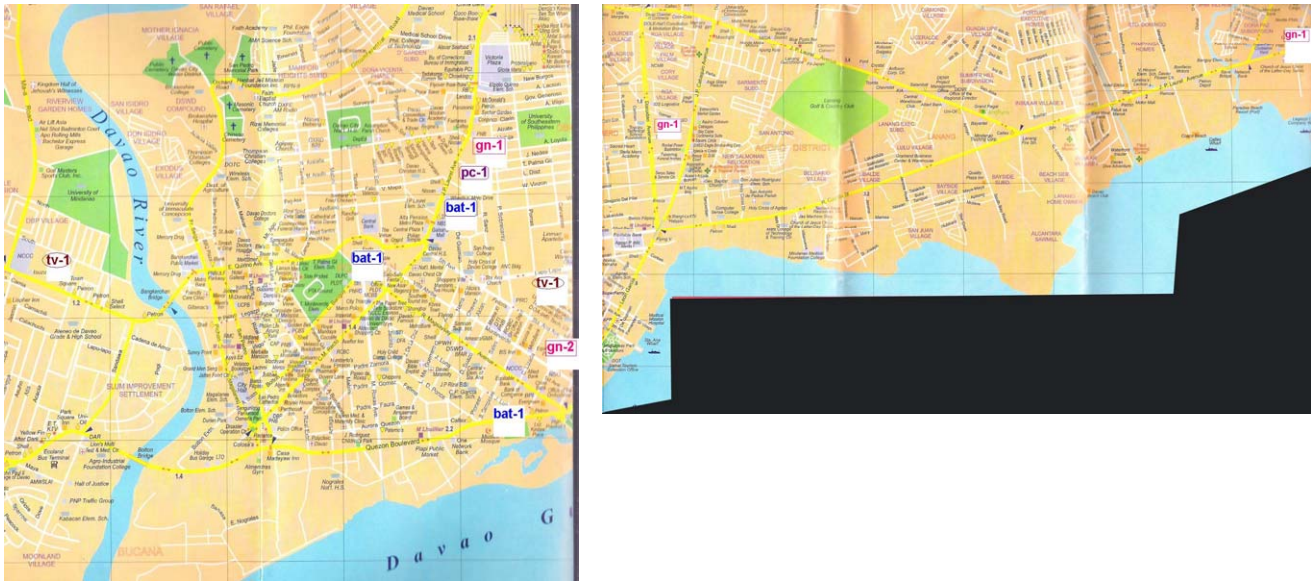


Figure 2.3.32 Distribution of Respondents, Davao City

b General trade situation

Based on reconnaissance survey, it was observed that most of the appliance stores sell new units of unbranded/ less-known brands. Compared to Metro Manila, surplus appliances in Davao City are more expensive, and given that some appliance stores offer installment plans with daily payments for brand new items (as in Metro Cebu), consumers opt to buy brand new over secondhand units. It is worthy to note that at least four importers in the Bureau of Import Services database have already closed down.

Cell phone shops vending accessories and batteries are more ubiquitous. Considering that batteries mostly sourced from Metro Manila, retail prices are cheaper in Davao, ranging from PhP 70-200. Even the latest models of cell phone units are less expensive than in Manila.

c Disposal

As in the other study areas, E-shops maximize the value of defective electronic items by using their components as spare parts. E-wastes from warehouses seem insignificant, some importers mix defective items with the functional items and are sold in bulk. One importer shared that nonfunctional keyboards, TV cases and circuit boards are sent to a contact in China. Another PC repair shop obtains all their units from their main office in Cebu, which checks if these are functional prior to delivery, otherwise broken units are returned to Cebu. In the case of defective cell phone batteries, these are sent to their supplier in Manila or directly back to China.

(4) Repair Shop Practices

As mentioned in observations from the field, most independent surplus E-shops have in-house repair of unscreened defective units that come from the supplier. Repairs are also given as an after-sales service; while some entertain walk-in customers as in known electronics hubs like Raon. The

common practice is that defective units that are beyond repair are “butchered” or “chopped” (or in local parlance, “kinakátay/ kinakarné/ kinakahoy”) for whatever electronic parts that can be used for other units or appliances. Repair procedures are presented for each target E-item, together with flowcharts detailing the fate of the components. These diagrams also include the flow from the distribution process to recycling and will be referred to in the discussions on collection and disposal.

1) Televisions and computer monitors

Figure 2.3.33 integrates information from 10 TV and 13 PC monitor dealers/repair shops. Seven of these respondents (6 from Batangas City and one in Metro Cebu) are satellite branches of TV and PC distributors that do not repair on-site and return broken units to main warehouses in Manila, Cavite or Cagayan de Oro. Other PC parts are addressed in a separate diagram.

Usually less than 10 television units are discarded in a month, although one respondent in Cebu estimated about 12 were disposed of in the last month. Love Electronics Service Center, which has 17 branches across Metro Manila and Rizal, disposes about 150-200 unclaimed/ non-functional units in a year. These junk units are collected from all their branches and sold in bulk via bidding. They used to contact a Bulacan-based plastic recycler; however, their buyer in recent years has been Omni Logistics, which reportedly has connections with television manufacturers of the TCL brand. As far as the respondent knows, the picture tube is processed as a whole by a company called Philips Titan.

As for computer monitors, disposal rate is similar to TVs (< 10/month); however, some respondents in Cebu would discard 20 to 40 monitors in a month. Again, a respondent has heard of CRTs sent to South Korea for repair and used as part of “TCL” TVs. Junkshops also buy monitors independent of CPUs; a Cebu respondent said that CRTs are bought by a Chinese friend of the owner and assumed that these are sent to China.

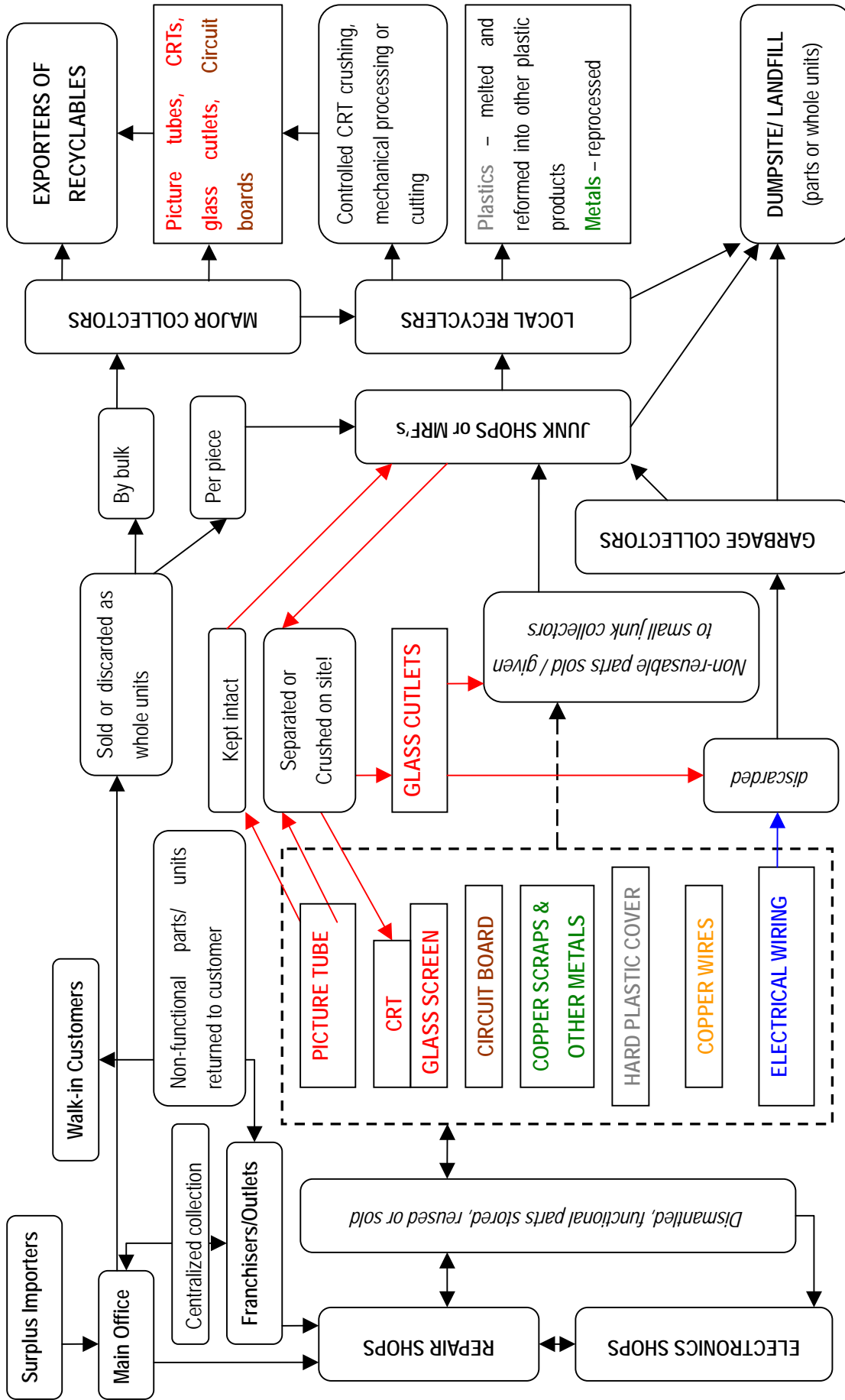


Figure 2.3.33 TV and Monitors Flow Chart

2) Refrigerators

A total of seven refrigerator dealers and repair shops were interviewed regarding the fate of E-components, summarized in Figure 2.3.34. Respondents in Batangas City are purely repair shops as there were no surplus shops located in the area. Of these respondents, only one from Cebu was able to estimate that around 5 units are disposed in a month. Noteworthy would be the varied ways in handling the refrigerant – only the two repair shops in Batangas City mentioned that they use appropriate measures for Freon re-injection or recovery.

3) Personal Computers

For the flowchart of the fate of computer components (Figure 2.3.36), 14 dealers and/or repair shops were interviewed. Disposal rate of whole units ranges from 5 to 40 per month. When itemized, CPU casings, keyboards/mouse and monitors are the most frequently disposed parts.

Disposal methods vary depending on the location of the PC shop and whether it is independent or a branch of a nationwide dealer. In the case of the latter, bulky units like monitors are usually collected by the main office. Reusable parts such as video/sound cards, motherboards and hard disks are stocked in the shop, as well as smaller items like keyboards and mouse. Also, since customers usually buy brand new replacement keyboards and mouse, it could be assumed that these are stored at home by the consumer for eventual disposal as municipal waste. Another common practice of repair shops would be to return non-functional or obsolete parts to the customer after repairing or upgrading of their central processing unit; hence the burden of disposal would be at the consumer. Plastics, metals, and wires are usually sold to junkshops.

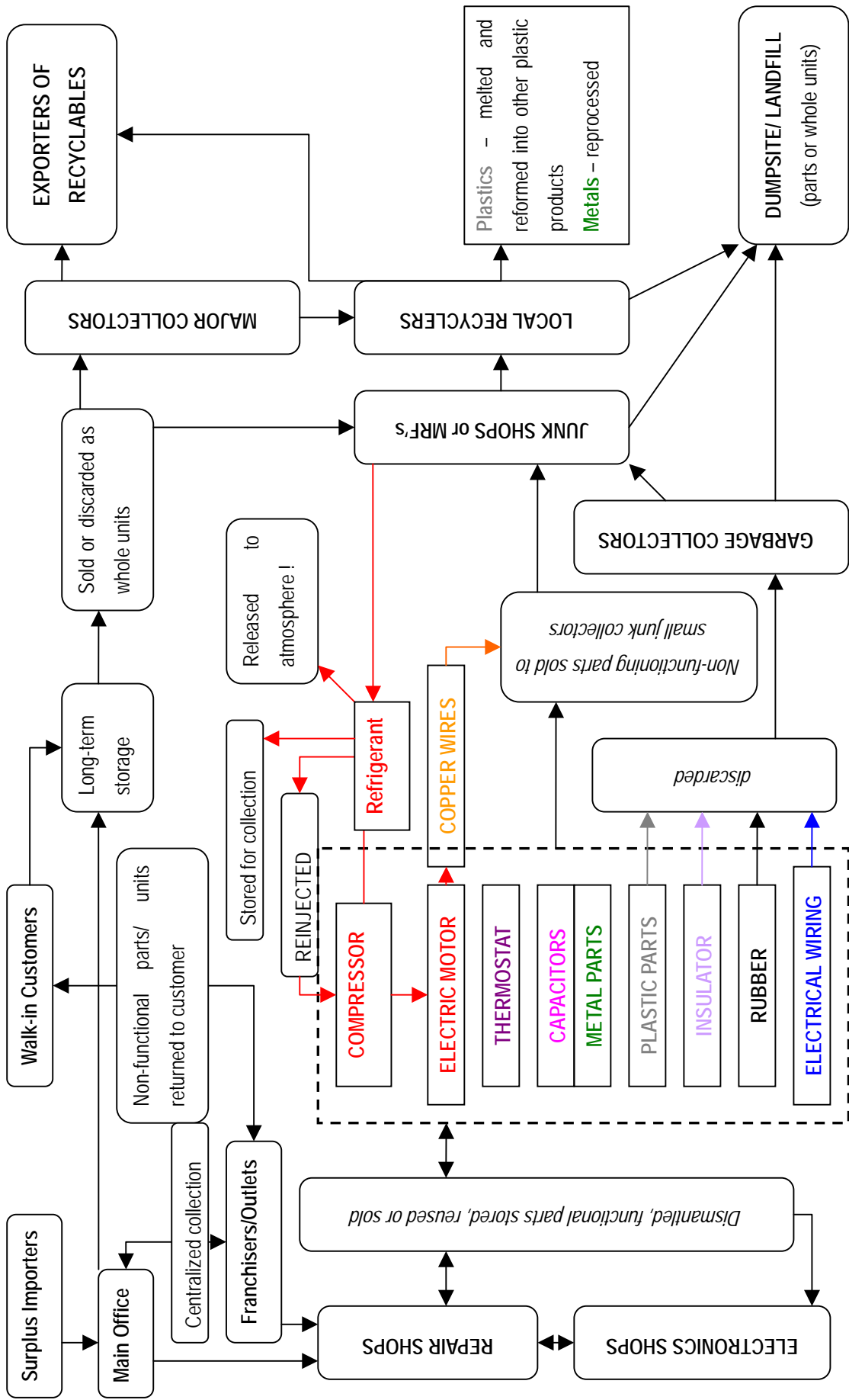


Figure 2.3.34 Refrigerators Flow Chart

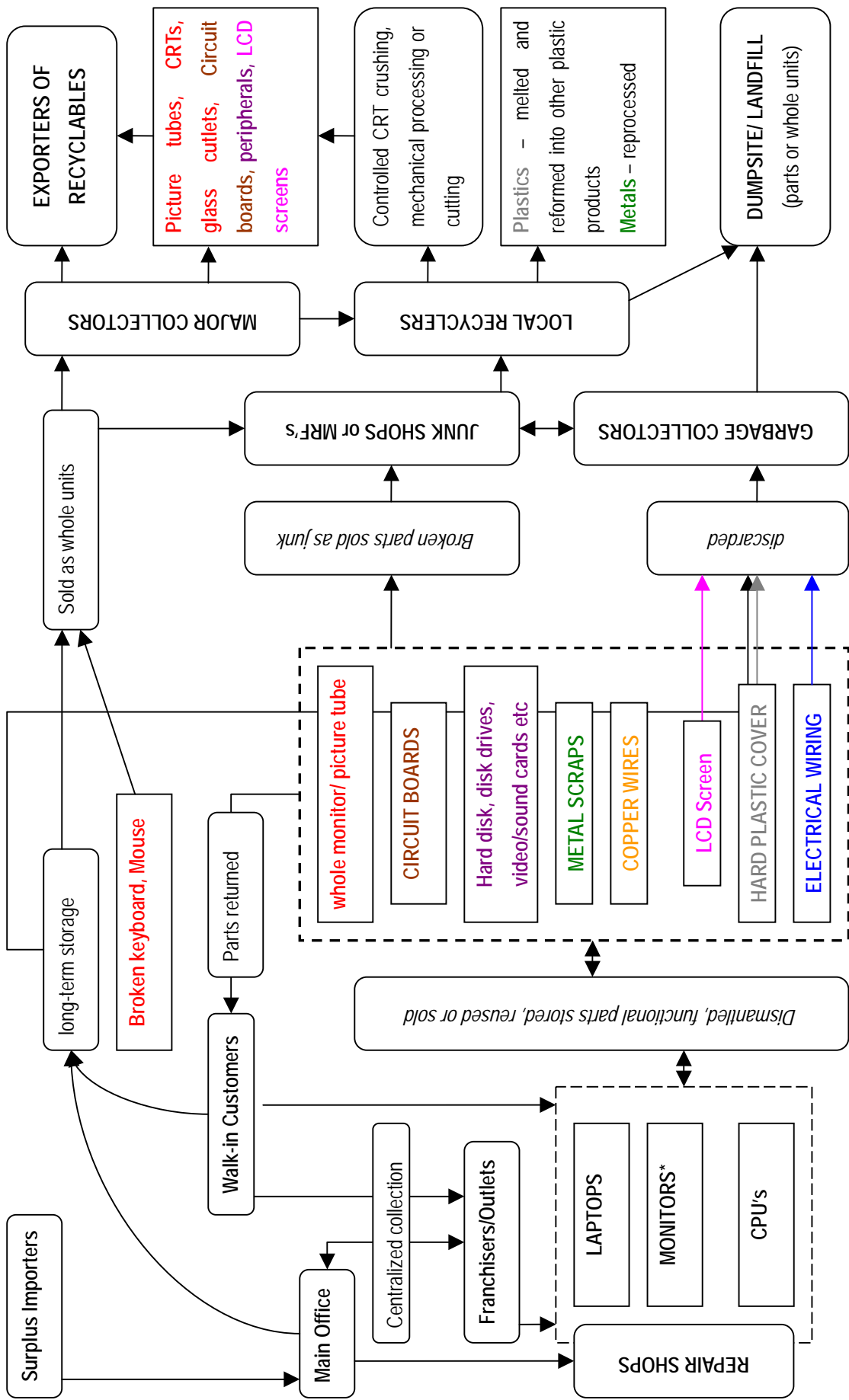


Figure 2.3.35 Personal Computers Flow Chart

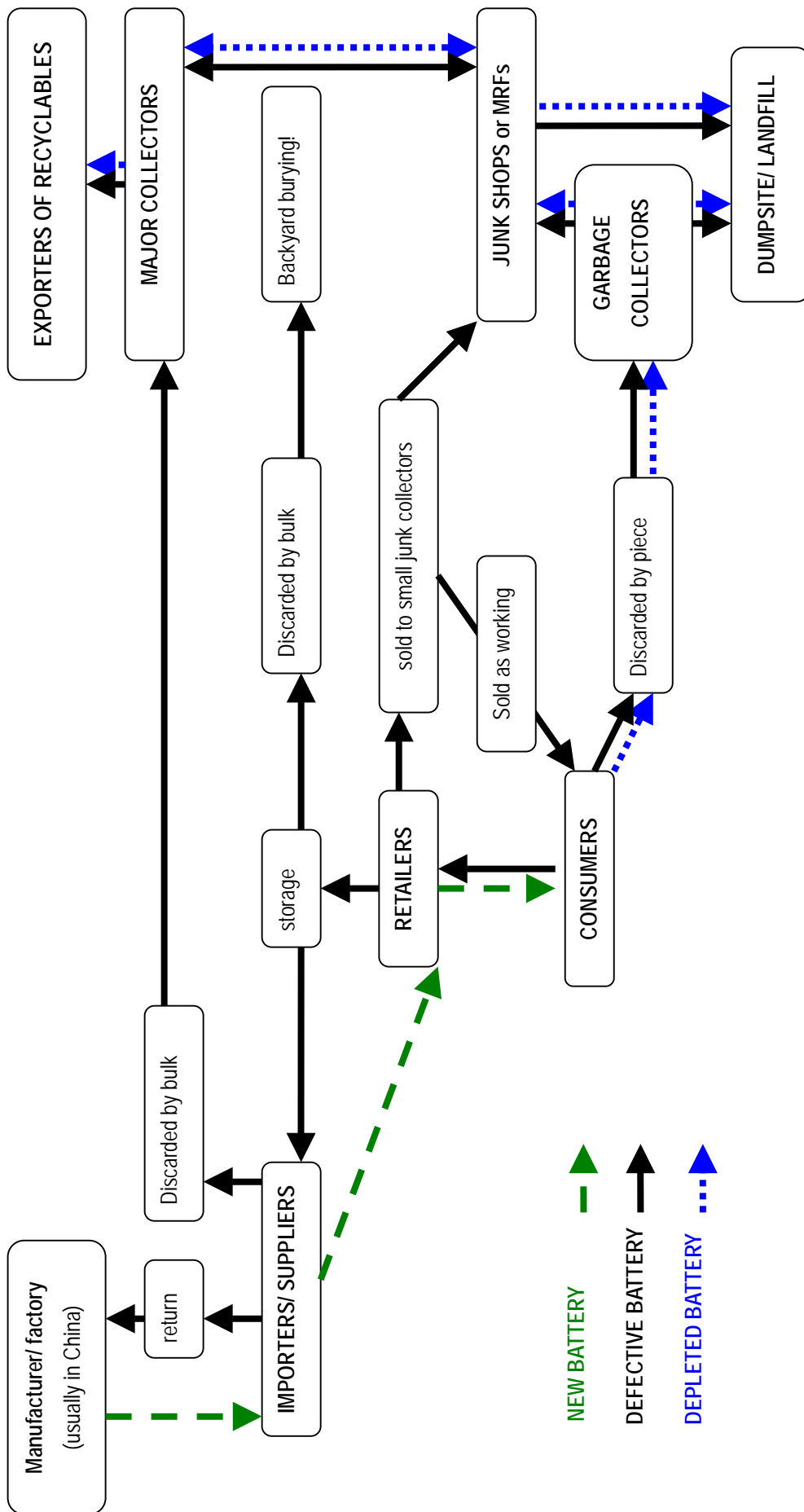


Figure 2.3.36 Cell Phone Batteries Flow Chart

4) Cellular Phone Batteries

The diagram for cell phone batteries (Figure 2.3.36) illustrates more of the trade flow of this target E-item based on interviews with importers and retailers, based on 16 respondents. There is a system wherein batteries found to be defective after screening upon delivery are stored and returned to the supplier in bulk. These suppliers might be based in Manila, in which case they collect and return to the mother factory (usually in China). Depleted batteries are usually stored at home by consumers and eventually get mixed with municipal waste, and some shops in Cebu and Davao have admitted burying these batteries in the ground. There have been reports of fraudulent re-selling of defective batteries. Monthly disposal rates range from less than 10 in Batangas City, about 20-50 units in Cebu City and Davao, to a high of 100 units in one Manila-based shop.

5) Collectors, Recyclers and Exporters

E-components that are not reused in repair are generally sold or given to junkshops. Plastic, metal and glass parts that may still contain residual E-components or hazardous waste, such as lead-laced glass from picture tubes, are treated as and mixed with traditional recyclable material. This is also the case for e-shops located in malls, unless they have arrangements with their supplier or main office regarding centralized collection and disposal. Table 2.3.13 shows some price ranges given by repair shops from surveys in the four study areas and interviews with some local recyclers.

a Centralized collection and disposal

Surplus dealers with nationwide coverage generally practice centralized collection and disposal, particularly within Metro Manila and adjacent provinces. While Cebu and Davao E-shops mentioned return of defective units back to suppliers outside the region, a good number of units can be assumed to stay within the island/ city. Some Binondo-based (Chinese) main offices hesitate to divulge how they dispose of the collected E-waste from their branches; others have direct connections with e-waste recyclers abroad.

Members of the HMR Group of companies such as Save on Surplus (S.O.S.) and Uniz Econo usually sell their e-waste to local recyclers, particularly HMR Envirocycle located in Sta. Rosa Laguna, also a member of the HMR network. Envirocycle basically engages in dismantling E-items and ties-up with recyclers for plastics (Polytrader Plastic Products in Laguna) and metal components (Philippine Recyclers, Inc. in Bulacan). For residual e-waste, these mainly involve mechanical/physical processing i.e. cutting, for exportation to specialized recyclers mostly in South Korea, and some from Japan, Australia and Malaysia. Circuit boards and picture tubes are exported as a whole to South Korea.

Table 2.3.13 Price list of E-waste and other recyclables

Item	Description	Selling Unit Price (PhP)
TV	Whole units, non-working	2,000/ truck 25 – 500/pc
Ref	Whole units, non-working	700/pc
Cell phone batteries	Whole (non-working) unit	3-5/ pc
Picture tube	Whole working unit	150/ pc
Picture tube	Whole non-working unit	50/ pc
CRT	Per kg	8/kg
Circuit boards	Per piece – “digital”	50/pc
Motherboards, video/sound cards etc	Bulk per kg for precious metals recovery	2,500/kg
Copper wires	Bulk	80-100/kg
Electrical wires	Bulk	4-8/kg 20-40/kg
Copper scraps	Bulk	225-300kg
Other metals	Per kg – ref casing, etc Per kg - “lata” – tin	18-22/ kg 75/ kg
Hard plastic	Per kg Per kg – refrigerator /TV casings, etc	5-8/kg 18-20/kg

b Recyclables Collection Events

Since 2002, the Philippine Business for the Environment (PBE) has spearheaded waste markets, dubbed as Recyclables Collection Events (RCEs), geared not just for traditional junk materials but also for E-waste. Private groups and individuals are encouraged to bring their waste either for trade or donation to accredited recyclers of each type of waste present during the event. This year has seen replications of the RCE, usually done annually during Earth Day, by local government units of Quezon City, Marikina City, La Trinidad Benguet, Cebu City, and Surigao, Cagayan de Oro and Davao in Mindanao. These were also in cooperation with local business groups and chambers of commerce. During RCEs handled by PBE, the secretariat in-charge made sure that there should only be one invited/assigned recycler/buyer per type of recyclable to avoid possible conflicts that may rise in the process. These buyers usually have facilities in Bulacan, Laguna or Cavite. In the La Trinidad, Cebu and Davao events, multiple buyers/ local recyclers were tapped (not based in Luzon/ Metro Manila) so it can probably be assumed that the waste collected stayed within their immediate area of jurisdiction/ Cebu island/ Mindanao.

From September to December this year, PBE is hosting monthly RCEs in Makati and Muntinlupa, in cooperation with the local Environmental Sanitation Centers and Materials Recovery Facilities. One RCE held in Muntinlupa last Oct. 20 was visited for this study. The manager of the MRF in Muntinlupa shared that usually their MRF accommodates 10-11 tons of recyclables in a month, but in the past three months, there has been an observed reduction of this volume to 6-7 tons per month. They have attributed this to RCEs as well as an increase in a number of small junkshops in the area; locals have seen that this could be a viable business. He mentioned that HMR Envirocycle helps locals to set up junkshops to increase collection efficiency and recovery volume particularly of non-traditional waste.

Table 2.3.14, published in PBE's quarterly magazine (Business and Environment, Vol. 11, No.3, 2006) summarizes the volume of waste collected in the past RCEs since 2002. This had a total monetary value of PhP 2 Million and is equivalent to about 1,300 cubic meters of landfill space avoided and 2,000 saved trees.

c Disposal of cell phone batteries

Given its high consumption volume and distribution, cell phone battery disposal and recycling proves to be problematic since there is no known recycler of cell phone batteries in the entire Philippines. Even during the RCEs, cell phone batteries brought are collected by a lead-acid battery recycler based in Bulacan, however they admitted that they have no processing facility and these are just stored.

Table 2.3.14 Volume of Collected Waste, RCEs

Type of Recyclable	Unit	Volume Collected		Total Volume
		Earth Day RCEs, '02-'06	Earth Month June 2006	
Junk electronics/ electrical	pcs	4,250	2,392	6,642
Used ink toner/cartridge	pcs	3,019	116	3,135
Used paper, paper products	kg	84,039.30	17,990.10	102,209.40
PET	kg	2,643.70	1,625.40	4,269.10
Non-PET plastic	Kg	1,333.50	5,862.90	7,196.40
Scrap glass/ shards Bottles	kg/ pcs	761.50	5,281.8	6,043.30
Aluminum cans	kg	1,088	316.40	1,404.40
Tin cans	Kg	256.4	39	295.4
Paint cans	Pcs	90		90
Scrap metals	Kg	612.50	1,426.94	2,039.44
Scrap iron	Kg	108	198.50	306.50
Metal alloys	Kg	2		2
Copper brass	Kg		5	5
Used oil	L	24,000	4,700	28,700
Used tires	Pcs	636	2,026	2,662
Car lead acid batteries	pcs	10,529	152	10,681
Total Monetary Value	PhP	1,821,687	249,676	2,071,363
Landfill space	m³	1,126	147	1,273

There have been efforts by local industry leaders to collect cell phone units and batteries. According to an article in PBE's Business and Environment magazine (Vol.8, No.1, 2003) Nokia launched "The Future is in Your Hands" back in mid-2000, wherein bins were set up in Nokia Care Centers in Metro Manila, Metro Cebu and Davao. Collected units and batteries were then sent to Citiraya Industries, a Singapore-based recycling firm. To date, there are 120 bins across the Asia Pacific region. Sony Ericsson also has phased out the use of nickel cadmium batteries in their mobile phones.

Despite these efforts, there seems to be a lack of information on the hazards of disposing cell phone batteries in city landfills or by backyard burying, as shown by attitudes of consumers and battery

shops. The threat of improper disposal batteries in general has not been fully recognized yet as there seem to be no clear-cut policies or actions towards systematic collection of used batteries and disposal or recycling of these wastes.

d Exportation

The previous study by SAGIP Environment showed data from the Environmental Management Bureau on exportation of E-waste from 2002-2005. These E-wastes are listed as printing wiring board and trimmings, electronic components and ferrous scrap. Exportation has increased from about 55 metric tons in 2002 to about 1,300 MT in 2005, mostly to Singapore and Japan. South Korea was also listed as an importer of e-waste in last year's EMB data. Defective cell phone batteries were not included in the list, and aside from internal agreements for return and replacement between local and international suppliers, the researchers did not come across major exportation such during the course of this study. The BOC Exportation Division was requested for exportation data on E-waste; this was granted although data would only be available after this writing.

(5) Conclusions and Recommendations

Televisions still capture the majority of the market for surplus items; while among the various types of computer surplus items, monitors have the highest demand and turnover rate. This may be attributed to the popularity of Internet and gaming shops in the Philippines.

Cell phone batteries and mobile phones in general pose the most concern in terms of importation, consumption and disposal. The cell phone battery industry is highly unregulated and is composed of many players that import substandard batteries that are probably not subjected to quality testing and product screening. Considering the penchant of local consumers to acquire the latest mobile phone model, batteries that correspond to these new models are also consumed rapidly, while those for old models are disposed through various means. Most of these hazardous wastes are probably mixed with municipal waste and find their way to the dumpsite. Mislabeling of battery components is also possible (i.e. Ni-Cd labeled as Ni-MH) and some are not labeled at all, making appropriate treatment and disposal methods more difficult.

2.4 Current Status of Recycling Industries

2.4.1 Paper and Pulp Industry

(1) Pulp and Paper Industry

1) Current status

Despite the fact that the Philippines hold extensive forest resources, the timber use was limited to mainly wood fuel since the timber use for papermaking has traditionally been restricted. Consequently the size of the Philippines' pulp and paper industry is among the smallest in ASEAN

countries.

History of pulp and paper industry in the Philippines only began in recent years when large-scale paper mills were constructed in 1950s-60s. In 1980s, investments on some high-speed paper machines were made; however, there has no major investment projects since the Asian financial crisis in 1997. As a result, most of pulp/paper factories in the Philippines use out-of-date machines and equipments, except for foreign-affiliate companies.

The industry as a whole directly employ approximately fifty-six hundred workers. When workers in related filed such as waste paper collection are included, the figure exceeds 100 thousands, indicating the importance of the industry in the Philippine society.

Table 2.4.1 shows the amount of production, import and export during the period of 2002 - 2004. As the table indicates annual production of paper/cardboard ranges from 900 and 950 thousand tons, of which newspaper paper and Kraft packaging paper account most of the production. In case of newspaper paper, the production exceeded the domestic demand, and exporting about 40% (120-150 thousand ton/year) to the foreign market. In the meantime, the printing and writing paper, paperboard, cardboard and sanitary paper relied on import to meet the domestic demand. The rate of import is about 60%, 45%, and 70 % for the printing/writing paper, the paperboard/cardboard, and the sanitary paper, respectively.

The total consumption of paper and paperboard was approximately 140 thousand ton/year whereas the consumption per capita was only 15.7kg, which is well below the world average of 55.6kg. Nonetheless, consumption of paper and paperboard is expected to increase in accordance with the economy growth in the future.

Table 2.4.2 shows production (& waste collection), import and export of pulp and waste papers in the Philippines during 2002 to 2004. The production of pulp and Kraft pulp are relatively limited, 170 thousand tons and 95 thousand tons, respectively. Also, 7 to 8 thousand tons of mechanical and non-timber pulps were produced domestically. As for the bleached Kraft pulp, approximately 90% was made in the Philippines, but two-third of un-bleached Kraft pulp was being imported. The mechanical pulp was used for the newspaper paper, which was entirely produced domestically. For the bagasse pulp, the production has been decreasing due to its high wastewater treatment cost to deal with its high BOD.

Table 2.4.1 Production, Import and Export of Paper and Paperboard in the Philippines
(Unit: 1,000 ton)

Product	Production			Import			Export		
	2002	2003	2004	2002	2003	2004	2002	2003	2004
Newspaper	294	293	299	14	4	1	147	131	122
Printing/Writing	95	103	113	173	176	156	0	0	0
Sum	389	396	412	187	180	157	147	131	122
Paper board for paper packaging	117	119	120	65	62	80	0	0	0
Cardboard paper	255	284	297	256	239	242	0	0	0
Kraft package paper	102	102	106	5	10	12	0	0	0
Sum (package paper)	475	505	523	326	311	334	0	0	0
Sanitary paper	23	22	22	13	41	46	0	1	1
Other paper	5	5	5	1	1	1	0	0	0
Sum	28	27	27	14	42	47	0	1	1
Sum (Paper and paper board)	892	928	962	527	526	538	147	132	113

Source: PPI (Pulp and Paper International)

Table 2.4.2 Production, Collection, Import and Export of Pulp and Waste Paper in the Philippines

(Unit: 1,000 ton)

	Production (Waste paper; collection)			Import			Export		
	2002	2003	2004	2002	2003	2004	2002	2003	2004
BKP	22	23	23	40	51	42	0	0	0
UKP	72	73	73	15	5	8	0	0	0
Sum (KP)	94	96	96	55	56	50	0	0	0
Mechanical pulp	36	37	38	4	2	2	0	0	0
No wood pulp	37	39	42	0	1	4	17	18	20
Other pulp	0	0	0	11	na	na	0	0	0
Sum (Pulp)	167	172	176	70	59	56	17	18	20
Waste paper	417	454	488	365	375	370	2	7	8

Note: Number of pulp factory; 6, Capacity of pulp production 20 thousand ton/year

KP: Kraft Pulp, BKP: Bleached Kraft Pulp, UKP: Unbleached Kraft Pulp

Source: PPI

It should be pointed out that the Philippines' pulp and paper industry heavily rely on waste papers as their raw materials. However, the annual collection of waste papers -- 450 thousand tons, does not meet the domestic demand so that waste papers imported from various countries including Japan and US. Annual volume reaches between 350 and 400 thousand tons. There is no export except newspaper papers.

Following Table 2.4.3 shows the calculation of waste paper utilization rate in the raw materials of papers. The rate reaches 80%, in which 60 % of collected waste paper comes from Metro Manila and CALABARZON area. The waste paper generated in local area, such as northern Luzon, Visayas and Mindanao was not fully utilized because of the problem of the collection system and high transportation cost. On the other hand, both prices and qualities of domestically collected waste papers are very close to that of imported ones so that industry may increase the use of domestically collected waste papers if their supply increases.

Table 2.4.3 Waste Paper Utilization Rate

		2002	2003	2004
Raw material* (ton)	Pulp (A)	220	213	212
	Waste paper (B)	780	822	850
Sum (C)		1,000	1,035	1,062
Product (ton)		892	978	962
Waste paper utilization rate (B)/(C) (%)		78.0	79.4	80.0

Note: Raw material = Production-Import-Export

Table 2.4.4 shows the capacity of and products from pulp and paper mills in 2002. Figure follows illustrates location of the major paper mills. The capacity of the mills is relatively small, or around 200 thousand ton/year, even for the largest mills such as Trust International Paper Corp. and United Pulp & Paper Co. Almost all mills locate Metro Manila and its vicinity; which makes transportation cost of wastepaper from the local place very high.

One of the characteristics of the industry in the Philippines is that 'abaca pulp' that is used for bank notes are produced. The Philippines hold the dominant roles in Abaca pulp production in the world with approximately 85% shares.

According to the PULPAPEL, cost structure of the industry is as follows; raw material 47%, electricity 26%, fuel 13% labor cost 5%, and other overhead 9%. The electricity and fuel cost makes up a large part of the producing cost along with the materials cost. The average unit consumption of electricity of the paper mill is 1,200 kWh/ton.

The electricity price is higher than other ASEAN countries; the appreciation of current crude oil price affects the energy cost up. In order to address this issue, the paper mills are trying to save energy and improve production efficiency, for example, by speeding up rotation of paper making machine, and stopping of inefficient machines, etc.

A large paper company, United Pulp & Paper Co, established an own power plant to reduce energy cost in January 2006. The output of this plant is 25 thousand kW and it uses biomass fuel.

Table 2.4.4 Capacity and Production of Pulp and Paper Factories in the Philippines (2002)

Paper mill

	COMPANY/ MILL	Actual Prod per day, MT	Rated Cap 1,000t/ year	Location	Product Lines
1	Aclem Paper Mills	50	15	Manila	NP, WP, WG
2	Alliance Paper	7	2	NA	NP, P/W
3	Asia Paper Industrial Corp.	40	12	Quezon	P, W
4	Asgard Paper Mill	30	9	NA	M, L
5	Bataan 2020	80	24	Bataan	P, W
6	Chanmeco Paper	30	9	NA	CB/ M
7	Container Corp. of the Phil	40/65/160	79.5	Quezon	M, TL, NB
8	Dasmariñas Paper Mills	40	12	NA	NB, CTB

COMPANY/ MILL		Actual Prod per day, MT	Rated Cap 1,000t/ year	Location	Product Lines
9	East Asia Paper Mfg. Corp.	20	6	Cavite	T
10	Fedco Paper Corp.	60/120/120	90	Laguna	P/W/CTB
11	Fiber Sorting, Inc.	10	3	Pampanga	CB, M
12	Fortuna Paper Mill	40	12	NA	LM
13	Globe Paper Mills	30	9	Manila	P/W, WR
14	Hansson Paper (Phils)	60	18	NA	P/W
15	Intercontinental Paper Industries	60	18	Laguna	P&W/M
16	Kimberly-Clark (Phils)	70	21	NA	T, SP
17	Liberty Paper Inc.	40	12	Bulacan	P/W, ML
18	Mayleen Paper	80	24	NA	P/W, ML
19	Oxford Paper	20	6	NA	P/W
20	Noahs Paper Mills Inc.	70	21	NA	P/W
21	Paper City Corp of the Phil	80	24	NA	CB/BB, P/W, CTB
22	Paperland/ Valley Pulp	10/15/15	12	Quezon	P/W/WR, NP
23	Polymart (Kingsley)	17	5	NA	P/W, WR
24	Paramount	20/30	15	NA	P&W/M
25	Rosario Paper	5	1.5	NA	T, P/W
26	Rural Development Corp.	30	9	NA	P/W
27	SCA Hygiene Products Corp.	20/30	15	Cavite	T, P/W
28	Sunrise Paper	50	15	NA	M, L
29	Third Wind	20	6	NA	T
30	Trans-National Paper Corp	70	21	Cavite	CTB, ML
31	Tri-Asia Paper Mill Inc.	50	15	NA	M, TL, NB
32	Trust International Paper Corp.	300/350	195	Pampang	NS, BP
33	United Pulp & Paper Co.	150/450	180	Bulacan	M, L, SKP
34	Vanson Paper Industrial	40	12	NA	P/W, CB
	TOTAL Number of Mills (34)	3094	928		

Pulp and paper mill

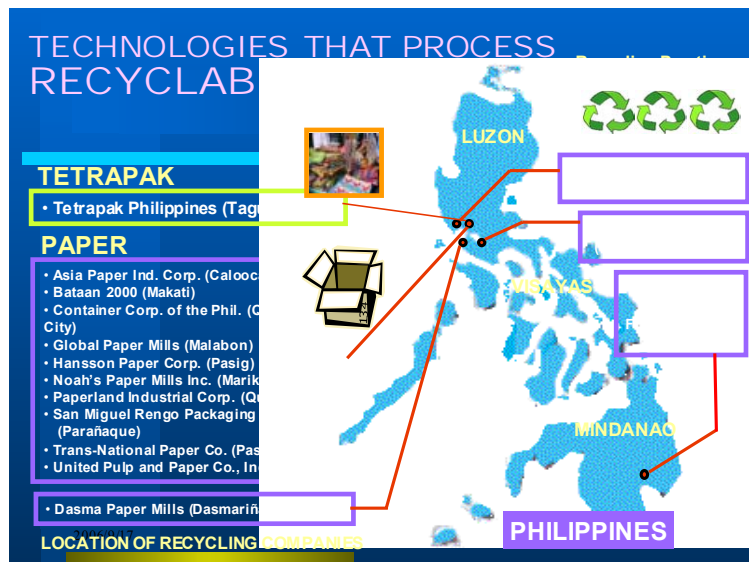
COMPANY/ MILL	Actual Prod per day, MT	Rated Cap 1,000t/ year	Location	Product Lines
New PICOP	230	75	Surigao del Sur	NS, TBP, LM
Central Azucarera de Bais Baggase	920	13	NA	P/W

Abaca pulp mill

COMPANY/ MILL	Product Lines
Albay Agro Ind. Dev't.	Abaca Pulp
Canlubang Pulp Mfg.	Abaca Pulp
Isarog Pulp & Paper	Abaca Pulp
New Tech Pulp Inc.	Abaca Pulp

Note: WR-wrapping, NP-newspaper, P-printing, W-writing, M-medium, L-liner, CB-chipboard, NB-newsboard, TBP-telephone book paper, CTB-coated board, LM-liner medium, T-tissue, SP-special paper, NS-newsprint, BP-book paper, SKP-sack paper, ML-medium line

Source: PULPAPEL



Source: National Solid Waste Management Commission

Figure 2.4.1 Location of Major Pulp and Paper Mills

It is expected for the Philippine pulp and paper industry that the competition with other ASEAN countries will become more serious in coming years. Following issues are indicated from interview and literature survey.

- In general, pulp and paper industry requires large investment which has been not been made in the Philippines since the Asian Economic Crisis in 1997. The out-of-date equipments and machines have been overused and it is necessary to modernize the plant and install the new machine/plant.
- Increasing trend of waste paper prices becomes a burden on management of paper mills.
- Most paper mills are located in the Metro Manila and it's vicinity. Therefore, the waste paper generated in the other areas cannot be transported to the place of production. In those regions, the waste papers are often used for other than raw material of making paper; for example as a cushion materials for packaging of fruits.
- No companies form an alliance with foreign paper companies, except United Pulp & Paper Co. It is necessary for the industry to precede the tie up with the foreign capitals. Thai blue-chip paper company has invested to United Pulp & Paper Co.
- Rate of electricity and other energy cost in total cost occupies large extent. Comparing to other Asian nations, retail electricity price has been very high in the Philippines. Moreover price of bunker oil that is fuel of boiler in paper mills have been increasing in recent years. Therefore, electricity and fuel cost account for great part in total cost of the industry, raising the necessity of energy saving measures.
- The paper industry needs to take additional measures for wastewater treatment to meet stringent environmental control. It is expected that investment for the wastewater treatment bring a huge burden to the industry.
- The Philippine has joined to the CEPT duty program to realize the AFTA. The duties on

raw material paper for newspaper, paperboard and cardboard has already reduced. In near future the duties within the ASEAN countries will be abolished, bringing the industry to harsh global competitions and free trade environment.

2.4.2 Steel Making Industry

Although the steel industry in the Philippines produced crude steel about 1 million tons in 1997, many steel making companies had gone out of business during the Asian financial crisis. To date, the industry had not recovered fully, and the crude steel production has been in decrease. In 2004, the industry produced only 400 thousand tons, which accounts for only 3% of the production in ASEAN countries.

The steel in the Philippines is produced by ERF makers (electric arc furnaces) from locally collected and imported scrap iron/steel. As mentioned before, the billet production in 2004 was only 400 thousand tons. In order to meet domestic demand, approximately 1 to 1.4 million tons / year of billet have been imported since 2000. The billet is used as raw material of the hot-roll mills.

The electric arc furnace companies produce billet and semi-final products. The billet is then supplied to hot-rolled mill to produce rod, reinforcing bar, sections and so on. The production of these hot-rolled products are 1.3 to 1.8 million tons per year; however, those productions do not meet the domestic demand. Consequently, 1 to 1.3 million tons of the rod, reinforcing bar, and sections are being imported from foreign countries. In the meantime, zinc plating sheet, pipe are produced approximately 0.5 million tons. Apparent consumption hot-rolled products is ranging from 3 to 3.7 million ton in a year.

The imported billet has come from Eastern Europe and CIS countries, like Russia and Ukraine where the price of the billet is cheap. In these countries, amount of steel accumulated in the society is quite large in quantity while consumption of steel products is small, comparing to the Soviet era. Thus the steel scraps have been exported to other European and Asian countries. In other words, the Philippine's steel industry is facing harsh international price competition.

Since National Steel Corporation, the only tinned steel plate producer in the Philippine, closed its Iligan steel plant in November 1998, there is no domestic production of tinned steel plate. Tin can and container manufacturing industry import all the raw material tinned steel plate from foreign countries. The amount of imported tinned steel is more than 200 thousand ton per year.

The steel consumption per capita in 2004 was 37kg; widening the differences from the neighboring countries. Steel for construction material like reinforcing bar, sections and hot dip galvanizing sheet account for 60 % of domestic demand. The demand of high-class steel for automobile and electric machine industry, however, is very limited. All of those steels are imported.

Table 2.4.5 Production of steel products in the Philippines

(Unit: ton)

	2000	2001	2002	2003	2004
Crude Steel Products	426,000	N.A.	550,000	500,000	400,000
Billet (by Electric Furnace)	426,000	N.A.	467,000	425,000	400,000
Steel for Castings	-	N.A.	83,000	75,000	-
Hot-rolled Steel Products	1,405,000	N.A.	1,632,000	1,770,000	1,265,000
Sections	200,000	N.A.	377,000	415,000	270,000
Bars	1,185,000	N.A.	1,255,000	1,355,000	995,000
Wire Rods	20,000	N.A.	-	-	-
Cold-rolled Products	220,000	N.A.	240,000	230,000	155,000
Cold-rolled Sheets & Strips (Carbon Steels)	220,000	N.A.	240,000	230,000	150,000
Coated Sheets & Strips	510,000	N.A.	533,000	484,000	404,000
Galvanized Sheets	350,000	N.A.	283,000	243,000	283,000
Others	160,000	N.A.	250,000	241,000	121,000
Pipes & Tubes	132,000	N.A.	193,000	210,000	102,000
Seamless Pipes & Tubes	N.A.	N.A.	-	-	-
Welded Pipes & Tubes	N.A.	N.A.	193,000	210,000	102,000
Finished Steel Products					
Sections	20,000	N.A.	377,000	415,000	27,000
Bars	1,185,000	N.A.	1,255,000	1,355,000	995,000
Wire Rods	20,000	N.A.	-	-	-
Cold-rolled Sheets & Strips	220,000	N.A.	240,000	230,000	155,000
Cold-rolled Electrical Sheets	-	N.A.	-	-	-
Galvanized Sheets	290,000	N.A.	283,000	243,000	283,000
Tinplates	-	N.A.	-	-	-
Other Metallic-coated Sheets	60,000	N.A.	250,000	241,000	121,000
Pipes & Tubes	132,000	N.A.	193,000	210,000	102,000
Finished Steel Products Total	2,107,000	N.A.	2,598,000	2,694,000	1,926,000

Source: SEAISI (South East Asia Iron and Steel Institute)

Table 2.4.6 Import of raw material, semi-final and final product of steel in the Philippines

(Unit: ton)

	2000	2001	2002	2003	2004
Iron Products	3,000				2,060
Pig Iron	3,000	N.A.	-	-	2,060
Ingots & Semi Finished Products	1,104,000	-	1,216,000	1,405,000	980,000
Billet	1,104,000	N.A.	1,216,000	1,405,000	980,000
Hot-rolled Steel Products	969,000	-	1,335,000	1,093,000	1,045,385
Rails & Accessories	1,000	N.A.	-	-	735
Steel Sheet Piles	11,000	N.A.	-	-	5,904
Sections	96,000	N.A.	127,000	110,000	122,778
Bars	40,000	N.A.	-	-	35,975
Wire Rods	256,000	N.A.	394,000	295,000	3,111,587
Plates	-	N.A.	-	-	94,088
Hot-rolled Sheets & Strips	565,000	N.A.	814,000	688,000	474,318
Cold-rolled Products	321,000	N.A.	425,000	380,000	442,118
Cold-rolled Sheets & Strips	321,000	N.A.	425,000	380,000	438,329
Cold-rolled Electrical Sheets	-	N.A.	-	-	3,789
Coated Sheets & Strips	346,000	N.A.	298,000	304,000	322,043
Galvanized Sheets	53,000	N.A.	-	-	78,148

	2000	2001	2002	2003	2004
Tinplates	153,000	N.A.	212,000	220,000	237,260
Others	140,000	N.A.	36,000	84,000	6,635
Pipes & Tubes	-	N.A.	45,000	45,000	58,399
Seamless Pipes & Tubes	-	N.A.	-	-	31,551
Welded Pipes & Tubes	-	N.A.	45,000	45,000	26,848
Cold finished & cold Formed	19,000	N.A.	N.A.	N.A.	N.A.
Cold Drawn Bars	1,000	N.A.	-	-	-
Steel Wires	18,000	N.A.	17,000	15,000	16,453
TOTAL IRON & STEEL PRODUCTS	2,762,000	N.A.	3,360,000	3,242,000	2,866,515

Source: SEAISI (South East Asia Iron and Steel Institute)

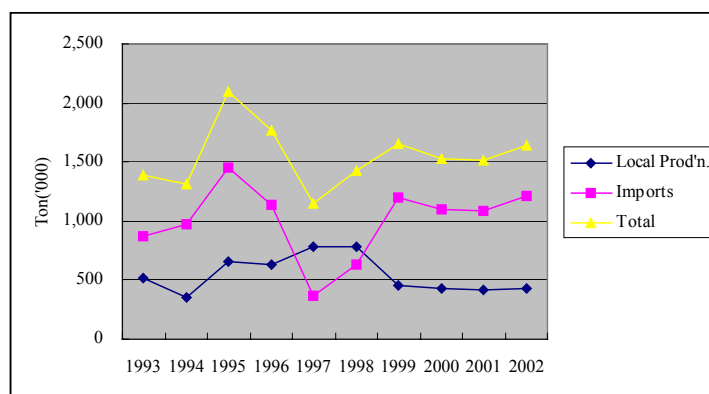
Table 2.4.7 Apparent Consumption of Hot-Rolled Steel Products

(Unit: ton)

	2000	2001	2002	2003	2004
Production (A) (Hot-rolled Steel Products)	1,405,000	N.A.	1,632,000	1,770,000	1,265,000
Import (B)	1,636,000	N.A.	2,103,000	1,822,000	1,867,945
Export (C)	-	N.A.	-	-	92,339
Apparent Steel Consumption (A) + (B) - (C)	3,041,000	N.A.	3,735,000	3,590,000	3,040,606

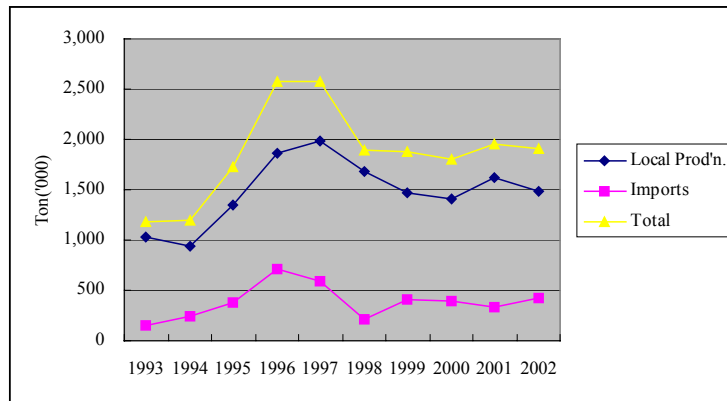
Source: SEAISI (South East Asia Iron and Steel Institute)

Figure 2.4.2 & Figure 2.4.3 show historical demand of billet and long steel products. The long steel product means hot rolled products like reinforcing bar, section and rod. The demand of the long products is closely related to business condition of construction industry.



Source: MIRDC

Figure 2.4.2 Billet Historical Demand



Source: MIRDC

Figure 2.4.3 Long product Historical Demand

Table 2.4.8 gives the import and export of steel scrap in the period between 2000 and 2004. Volume of steel scrap imports was smaller than export while small amount of stainless scrap and alloy steel were imported.

On the other hand, the export has been gradually increasing since 2002 on which China remarkably increase its steel production. The export was approximately 500 thousand tons in 2003 and reached around 900 thousand ton in 2004. Reasons of the expanding export are as follows;

- A major ERF company, BACNOTAN STEEL which had capacity of 300 thousand ton of billet, wet bankruptcy in the third quarter of 2001 (Decreasing of the capacity)
- Increasing of international steel scrap prices with the expanding China's steel production (Increasing of supply)
- Increasing of generation of steel scrap (Increasing of supply)

Numbers of new constructions and demolitions of old factories and buildings remained at low rate from late 1990s to early 2000s due to the downturn economy from the Asian Economic Crisis. However, the economy has gradually been in recovery so that those old factories/buildings has started to be demolished and replaced with new plants and/or buildings. This results in increasing generation of heavy steel scraps.

The steel scraps are exported mainly to neighboring countries, including Taiwan, Singapore and Thailand. It can be noted that great amount of steel scraps has been exported to small and medium small scale ERFs in Taiwan. Since distance between Manila and Kaohsiung is fairly short, ocean freight is cheaper than going to any other ports. Cargo ships with 20-foot container reaches at Kaohsiung port in 30 hours. Kaohsiung, one of the hubs of ocean transportation of Eastern Asia, is the second largest city in Taiwan.

According to NSO statistics, 70 to 80 percent of the total steel scrap export is denominated by the tinned steel scrap. However, local steel company agree that the figure might have been for misclassification because the tinned steel scrap could not be generated in such a great amount.

There are no nationwide data for the steel scrap generated. Therefore, JST estimates in a following manner;

The ERF companies have produced around 400 thousand tons / year of billet in recent years. The utilized steel scrap in the ERFs companies, as the raw material, is estimated to be 500 thousand tons, assuming the yield rate of 80 %. Then, amount of generation could be calculated as approximately 900 thousand tons ($400 + 500 = 900$) in a year.

Table 2.4.8 Import and Export of Scrap Iron/steel

(Unit: ton)

		2000	2001	2002	2003	2004
Import	Waste & scrap of cast iron	18	220	88	460	1,211
	Waste & scrap of stainless steel	583	1,609	2,371	16,439	1,174
	Waste & scrap of other alloy steel	1,323	481	267	2,277	20,320
	Ferrous waste and scrap	728	163	24	64	155
	Waste & scrap of tinned iron steel	-	-	47	-	-
	Total	2,652	2,473	2,797	19,239	22,860
Export	Waste & scrap of cast iron	324	-	-	15,604	133,122
	Waste & scrap of stainless steel	19,770	21,999	11,981	30,717	11,004
	Waste & scrap of other alloy steel	721	94	295	419	2,982
	Ferrous waste and scrap	464	582	1,717	6,682	13,039
	Waste & scrap of tinned iron steel	51,688	138,716	247,318	379,399	560,511
	Turnings, shavings, chips, milling waste, sawdust, filling, trimming and stamping	193	765	96	629	885
	Re-melting scrap ingot, iron/steel	3,637	18,905	44,736	60,851	160,517
	Total	76,798	181,061	306,143	494,301	882,058

Source: National Statistics Office

To date, there is no steel mill company that has a blast furnace in the Philippines. There is an affiliated company of Japanese steel maker located in Mindanao that has the only pyrite sinter in the Philippines. The company roasts iron ore and makes pyrite sinter, which is then exported to Japan.

On the other hand, there are five companies that have ERF mills with total capacity of 900 thousand tons, though actual production is limited to 400 thousand tons per year. There had been twelve ERF mills nationwide until late 1990s; however, many of them lost businesses when Asian Economic Crisis hit Philippines.

For example, the largest ERF and hot-roll company, BACNOTAN STEEL INDUSTRIES INC, went bankruptcy in 2001. Likewise, NATIONAL STEEL CORPORATION, a former government controlled steel producer, was sold to foreign capital. The NSC was, in the end, closed because of financial troubles. Due to those events, the supply chain of semi- and final- steel products in the Philippine had changed drastically.

There are more than sixty hot-rolled companies nationwide with a considerable volume of capacity, or more than six million ton per year. Both ERF companies and hot-roll companies are located in Manila and central part of Luzon island. The transportation of the scraps from other regions has become a problem.

Table 2.4.9 Major steel making and hot-rolled mills in the Philippines

	Name	Capacity	Location	Current status
Billet making	BACNOTAN STEEL INDUSTRIES INC.	Billet making; 300,000 ton/year EF; 55ton; 1 unit HRM; 1	Batangas (Calaca)	Modern plant, operation started in 2000, temporarily stopped in 2002
	NATIONAL STEEL CORPORATION	Billet making; 300,000 ton/year EF; 45ton; 2 units	Mindanao (Iligan)	Former Government running steel company, Full operation stop in 1999
	CATHY PACIFIC STEEL CORPORATION	Billet making; 220,000 ton/year EF; 25 ton; 1 unit Semi-automatic HRM	Metro Manila (Cainta)	
	CATHY PACIFIC STEEL CORPORATION	Billet making; 70,000 ton/year EF; 25 ton 2 units	Metro Manila (Taguig)	former Armco-Marsteel
	MILWAUKEE STEEL CORPORATION	Billet making; 150,000 ton/year EF; 40ton 1unit HRM 1unit	Pampanga (SanSimon)	
	SKK STEEL CORPORATION	Billet making; 120,000 ton /year EF 30ton 2 units	Pampanga (SanSimon)	
	AMALGAMATED IRON WORKS INC.	Billet making; 50,000 ton/year EF 15ton 1 unit	Metro Manila (Quezon)	
	ELEGANT STEEL CORPORATION	Billet making; 50,000 ton/year EF 15ton 1 unit	Pampanga (SanFernand)	
	MIDLAND STEEL CORPORATION	Billet making; 50,000 ton/year EF 25ton 1 unit	Metro Manila (Pasig)	Operation stop
	METRO COMCAST	Billet making; 50,000 ton/year EF 25ton 1 unit	Metro Manila (Valenzuela)	Operation stop
	ALLIED INTEGRATED STEEL CORPORATION	Billet making; 40,000 ton/year EF 12ton 2units	Metro Manila (LasPinas)	Operation stop
	ARMSTRONG INDUSTRIES	Billet making; 20,000 ton/year EF 10ton 1 unit	Metro Manila (Quezon)	Operation stop
	STEEL ASIA MANUFACTURING CORP	CTRM Capacity; 360,000 ton/year	Bulacan (Meycauyan)	J/V between local and Singapore companies (1996), Modern plant
	BACNOTAN STEEL INDUSTRIES INC.	CTRM Capacity; 300,000 ton/year	Batangas (Calaca)	J/V between PHINMA and Japanese integrated steel manufacturer Operation temporarily stop since 2002

	Name	Capacity	Location	Current status
	CATHY PACIFIC STEEL CORPORATION	Tandem roll mill 3 units Capacity; 300,000 ton/year (wire)	Metro Manila (Novaliches)	
	CATHY PACIFIC STEEL CORPORATION	Capacity; 300,000 ton/year	Metro Manila (Cainta)	
	CATHY PACIFIC STEEL CORPORATION	Capacity; 300,000 ton/year Product: Rod	Metro Manila (Taguig)	Former Armco-Marsteel
	CATHY PACIFIC STEEL CORPORATION	Semi-continuous roll mill Capacity; 250,000 ton/year	Metro Manila (Quezon)	
	PAG-ASA STEEL WORKS	Semi-continuous roll mill Capacity; 300,000 ton/year	Metro Manila (Pasig)	
	PRIMARY STEEL CORPORATION	Semi-continuous roll mill Capacity; 200,000 ton/year	Bulacan (Valenzuela)	
	FILIPINO METALS CORPORATION	Capacity; 250,000 ton/year	Bulacan (Valenzuela)	
	STRONG HOLD STEEL CORPORATION	Capacity; 200,000 ton/year	Pampanga	
	BINAN STEEL CORPORATION	Semi-continuous roll mill Capacity; 200,000 ton/year	Laguna (Binan)	

Note: EF; Electric Furnace, HRM; Hot-rolled mills, CTRM; Continuous Tandem Roll Mill

Table 2.4.10 Geographical Distributions of Steel Industries in the Philippines

	Electric Furnace company (Billet making)		Hot-rolled mill	
	Number	Capacity (1,000ton/year)	Number	Capacity (1,000ton/year)
Northern Luzon	0	—	0	—
Central Luzon	3	320	1	200
NCR	6	340	30	4,630
Southern Luzon	1	(300)	3	550
Visayas	0	—	4	460
Mindanao	1	(300)	2	160

Source: MIRDC (Metals Industry Research and Development Center)

Followings are issues of steel industry revealed from interview and literature survey;

- The Asian Financial Crisis devastated many industries in the Philippines, including steel, construction, machinery and electrical manufacturing industry. In the steel industry, many steel mills were forced to stop operation. The industry has not recovered to date.
- The current production capacity of ERF companies is estimated to be 900 thousand ton per year. However, actual production is said to be only 400 thousand ton, meaning they are operating at low production rate.
- High price of the electricity is a burden to electric furnace companies. Some companies are taking measures to save the electricity cost, for example, by directly connecting to National Power Company grid instead of MERALCO grid. This kind of practice does lower electricity cost; however, the high price of electricity is still big factor of cost rise.
- Approximately 1 to 1.5 million tons of billet is imported annually. Especially in recent years, import of cheap billet from CIS countries like Russia, Ukraine and Kazakhstan is increasing. This cheap billet importation has become a threat to the domestic steel industry.
- Hot-rolled products have been exposed to the international competition. Very low duties are imposed for these products as shown in the following table. There are cases where import products are cheaper than local products.

Table 2.4.11 Duty on Billet and Hot-Roll Steel Product

Billet		Reinforcing bar /section		Wire		Scrap	
MFN	CEPT	MFN	CEPT	MFN	CEPT	MFN	CEPT
3	3	3	3	5	5	0	0

Source: MIRDC

- Infrastructure building of aerial, land and marine transportation developed in backward. Transportation costs are big burden on the steel industry.
- Even though there are some technical standards for steel products in the Philippines, weak enforcement by the officials for complying the standards result in increasing amount of out-of-standard products imported. Furthermore, inspections have not always been

conducted properly so that volume of smuggling has become not negligible.

2.4.3 Glass Bottle Industry

Major glass products in the Philippine are flat glass and glass bottles. The largest glass bottle producer is the San Miguel Packaging Specialist, Inc (SMPS) that has four glass bottle factories nationwide and has total production of 775 ton per day. The total production of the glass bottles in the Philippines is estimated to be 310-330 thousand tons per year. In the meantime, amount of import of glass and cullet varied widely ranging from 3 to 35 thousand tons in the period of 2000-2004. Volume of export, on the contrary, was very limited.

SMPS is now constructing a new glass bottle factory in Cavite. After completion in September 2006, the production capacity will increase to 1,025 ton per day.

Currently, there are 260 employees in SMPS Cavite plant and produces many kinds of glass bottles (20-1,000 ml). The energy cost makes up between 25-30 % of total cost. Present cullet utilization rate is 60 %. The cullet is not currently supplied with sufficient quantities for following reasons;

- Returnable bottles, such as beer bottle, are re-used many times (Average re-use rate is twenty cycles)
- Recycle route is not established for wine bottles, etc.
- Junkshops and waste dealers do not collect used glass bottles since waste glass are heavy and the prices are not high.

Product yield is 93-95%. Reasons for reject of the bottle products are broken of bottles, interfusion of foreign materials and air bubbles. Energy cost rate in the total cost is ranging between 25 and 30 %. The company is experiencing hardships for the cost increase from increasing crude oil price.

Table 2.4.12 Volume of Import of cullet and glass waste in the Philippines

(Unit: ton/year)

		2000	2001	2002	2003	2004
Import	Cullet and other waste and scrap of glass	21,529	8,054	35,784	9,857	2,919
Export	Cullet and other waste and scrap of glass	67	14	68	115	73

Source: National Statistics Office

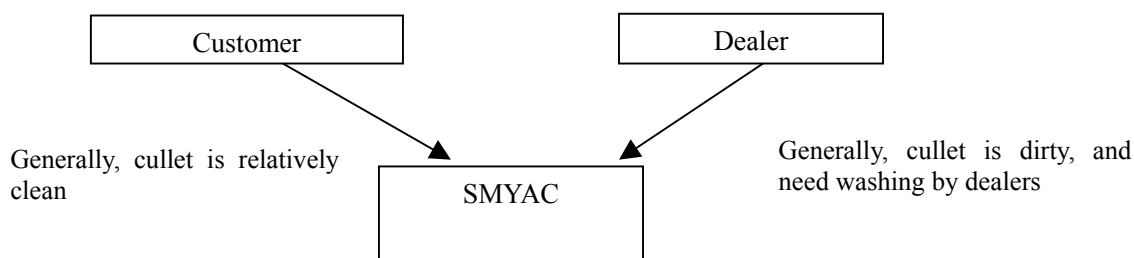


Figure 2.4.4 Flow of cullet of SMYA

The used glass bottles collected in the restaurants, liquor shops and canteens are often returned in cases and have few damages/spots. It is presumed that these bottles are being returned to bottling companies and re-used again. The junkshops have different prices for specific types of used glass bottles, for example for COCA COLA, local beer, imported beer, local brandy, soy source, and so on. Therefore, a quite large amount of used glass bottle from household and MRFs are believed to be re-used in the bottling companies.

Table 2.4.13 Glass bottle productions by San Miguel Packaging Specialist Group

	Place	Capacity (ton/day)	Number of lines	Name of company
Philippine	Manila	250	6	Manila Glass Plant
	Cavite	200	3	Premium Packaging International
	Cavite	180 (250)	3 -	San Miguel Yamamura Asia
	Cebu	145	3	Mandaue Glass
	Total	775 (1,025)		
Overseas	Vietnam (Haiphon)	130	2	
	China	120	2	

Source: San Miguel Packaging Specialist, Inc.



Source: National Solid Waste Management Commission

Figure 2.4.5 Location of Glass Product Manufacturers in the Philippines

2.4.4 Aluminum Products Manufacturing Industry

The Philippines was once one of major non-ferrous metal producers in the Asian countries. However, non-ferrous metal mining and smelting industry, except chromium, have declined in recent years. Currently, there is no primary aluminum smelter in the Philippines, and no new secondary aluminum smelters have been constructed after the Reynolds Philippine -- a comprehensive aluminum process factory, left Philippines.

Therefore, all new aluminum ingot and unwrought are imported from overseas. The amount is ranging between 25 to 34 thousand tons per year. In addition, approximately 10 thousand tons of

plates, sheets and strips, 15 thousand tons of aluminum foil, and 5.5 to 10 thousand ton of aluminum coil are imported. Aluminum coil is used as the raw material for aluminum can. Philippines' total import of aluminum ingot, unwrought and semi-final product is around 70 thousand tons.

The imported ingot and alloy undergo extrusion, casting, die-cast and forging in six aluminum process factories. Currently, there are six aluminum process factories in the Philippines. Their production has been in decreasing trend since there is less price competitiveness against products from neighboring countries including China. Therefore the production of processed aluminum products greatly dropped.

On the other hand, the import of aluminum scrap is only 1 to 2 thousand tons, whereas the amount of export reaches 20 to 28 thousand tons per year. According to the interview survey, the aluminum kitchenware manufacturing industry is using locally generated aluminum scrap as the raw material. The amount of raw material in the industry, aluminum scrap, is between 30 and 35 thousand ton. It can be assumed that the aluminum scrap is utilized only in the kitchenware manufacturing industry, which gives the estimation of total amount the aluminum scrap generated in the Philippines -- 50 to 60 thousand tons.

In contrast, a survey conducted by the MIRDC in 2002 revealed that the aluminum processing and casting industry were very active in late 1990s and early 2000s, reaching 110 thousand tons in 2002. Since then the production has been in decline.

The 2002 statistics shows the Philippine imported only 30 thousand tons of the ingots and unwrought of aluminum. In addition, the Philippines exported approximately 30 thousand tons of aluminum scrap in 2002.

Based on these data and information, the aluminum scraps generated by the industries, household, restaurants and commercial entities might exceed above estimated values, meaning it might reach around one hundred thousand tons.

Table 2.4.14 Import and Export of aluminum ingot, unwrought, semi-final product and scrap in the Philippines.

(Ton/year)

		2000	2001	2002	2003	2004
Import	Ingot & Unwrought	34,418	25,509	28,632	26,052	29,443
	Bars, Rods & Profiles	4,227	6,713	7,356	5,177	5,936
	Wire	701	1,298	2,207	4,999	1,509
	Plates, Sheets & Strips	9,478	9,633	10,685	11,439	10,712
	Can stocks	5,357	9,103	9,524	9,727	5,255
	Foil	16,481	14,441	13,377	14,599	14,615
	Powder	659	301	313	313	416
	Tubes, Pipes & Fittings	774	785	1,092	1,494	1,053
	Sum	71,436	67,783	73,187	73,801	68,947
	Scrap and Waste	410	709	1,384	2,249	1,255

		2000	2001	2002	2003	2004
Export	Ingot & Unwrought	1,802	273	110	215	
	Bars, Rods & Profiles	168	55	16	-	2
	Wire	-	-	-	0.5	2
	Plates, Sheets & Strips	237	184	23	213	31
	Can stocks	-	-	-	-	9
	Foil	1,138	400	583	1,070	488
	Powder	-	-	76	94	162
	Tubes, Pipes & Fittings	46	46	64	129	107
	Sum	3,391	958	878	1,723	800
	Scrap and Waste	21,633	26,320	28,440	21,878	19,053

Source: National Statistics Office

(1) Aluminum Kitchenware Manufacturing Industry

Consolidate Aluminum Smelter, Extruder & Kitchenware Manufacturing Association (CASEKMA) is the industry circle of aluminum kitchenware manufacturing companies. Current number of member companies is forty while there are more than one hundred non-member companies in the Metro Manila area.

Presently the industry is experiencing hardships from shortage of raw material of aluminum scrap and increase of import of cheap products from China and India. Fifteen CASEKMA member companies went bankruptcy between 2001 and 2002. Average operation rate in 2005 was 68%. In fact one of the member companies operated only three days in a week because of the shortage of the aluminum scrap.

In a factory, the aluminum scarp is melted by melting furnace and refined by refining furnace. In the process of refining of the scrap, aluminum dross is removed twice. Then reclaimed aluminum ingot was cast.

There are two kinds of aluminum kitchenware products, the products manufactured by sand molding and the other type of product manufactured by pressing.

The total consumption of member and non-member factories in 2005 was 31,250 tons. Approximately 19,500 tons lacked for operation in full capacity.

(2) Aluminum Can Manufacturing Factory

San Miguel Yamamura Ball Corporation in Cavite province, that produces 330 ml aluminum cans, is the only manufacturer of aluminum can in the Philippines. The annual capacity of body part is 620 million pieces, or equivalent of approximately 7.5 thousand tons per year. The aluminum coil, raw material for the can, is imported from South Korea and Australia. The aluminum scrap generation rate in the factory is 8% of which all the scrap is returned to the aluminum coil suppliers. Besides, ALCOA CSI Philippines affiliated company of Alcoa, which is the world largest aluminum producer,

manufactures several kinds of aluminum closures of the bottles.

2.4.5 Plastic Resin and Final Products Manufacturing Industry

In many Southeast Asian countries, naphtha cracking and ethylene plants were constructed as national policy in 1980s and 1990s, although those naphtha cracking or ethylene plant has not realized in the Philippines yet. The industry totally relies on import for olefin, which is the original raw material for the resin.

The Philippine plastic industry also produces Polystyrene and Polyvinyl chloride. However the industry import about half of raw material of these resins from foreign countries. The plastics resin is vulnerable to tough international competition, and the products rely on domestic consumption. In addition, the CEPT⁴ became effective within the AFTA member countries since 2003, resulting tough competition in the AFTA counties in recent years.

According to statistics in the period of 2000 to 2004 provided by the Philippine Plastic Industry Association (PPIA), annual production of PE was between 220 - 310 thousand tons, PP 180- 270 thousand tons, PVC 80 – 100 thousand tons, and PS 40 - 60thousand tons. Demand forecast estimates the demand of PE and PP will increase to 300 thousand tons per year. The current consumption is 220 thousand ton for PE and 18 thousand ton for PP.

In the meantime, the import of waste plastics is ranging from 5 to 15 thousand tons per year, while the export was between 50 and 80 thousand tons per year

Table 2.4.15 Production of Plastic Resin and Consumption of Final Plastic Products (2000- 2004)

		Raw Material	2001	2002	2003	2004	
Product	PE (Polyethylene)	Domestic	64,000	86,899	84,625	34,508	
		Imported	160,604	192,703	227,239	187,702	
		Total	224,604	279,602	311,864	222,210	
	PP (Polypropylene)	Domestic	127,000	150,825	119,043	63,620	
		Imported	98,750	116,826	127,354	120,301	
		Total	225,750	267,651	246,397	183,921	
	PVC (Polyvinyl- chloride)	Domestic	68,500	86,415	89,000	79,873	
		Imported	14,500	15,205	16,774	12,810	
		Total	83,000	101,620	105,774	92,683	
	PS (Polystyrene)	Domestic	34,200	34,200	25,428	34,032	
		Imported	7,133	20,528	33,600	23,815	
		Total	41,333	54,728	59,028	57,847	
	Total			574,687	703,601	723,063	556,661
	Import of finished Plastic Products			556,755	613,721	688,362	764,825
	Total consumption of finished plastics products			1,131,442	1,317,332	1,411,425	1,321,486
Share of domestic production (%)			51	53	51	42	

Source: PPIA

⁴ Common Effective Preferential Tariff

Table 2.4.16 Import and Export of Plastic Raw Material (Primary form)

(Unit: ton/year)

		2000	2001	2002	2003	2004
Import	Polyethylene (PE)	211,015	171,543	215,539	261,941	191,245
	Polypropylene (PP)	95,788	100,363	80,128	93,778	102,843
	Polystyrene (PS)	35,527	35,395	34,688	41,622	42,248
	Polyvinyl-chloride (PVC)	18,825	19,062	20,680	18,639	21,915
	PET	9,154	13,365	14,882	18,348	22,811
	Others	123,059	136,459	158,942	154,780	199,577
	Total	493,788	476,187	524,859	589,780	581,639
Export	Polyethylene (PE)	4,544	3,312	4,133	2,761	3,125
	Polypropylene (PP)	6,755	3,994	3,250	3,364	3,220
	Polystyrene (PS)	2,999	1,922	2,231	1,851	1,541
	Polyvinyl-chloride (PVC)	15,268	9,905	13,616	13,270	6,516
	PET	24	0	0	793	778
	Others	25,709	32,371	23,230	44,915	68,091
	Total	55,299	51,504	56,207	66,954	83,271

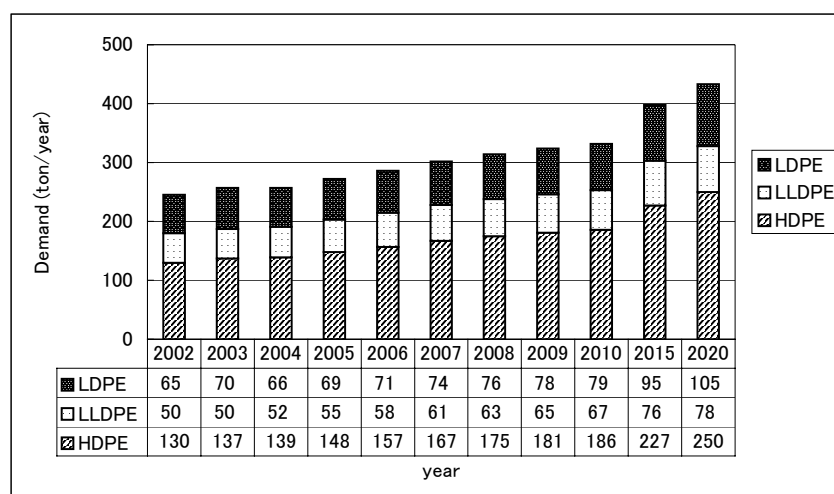
Source: National Statistic Office

Table 2.4.17 Import and Export of Waste Plastics

(Unit: ton/year)

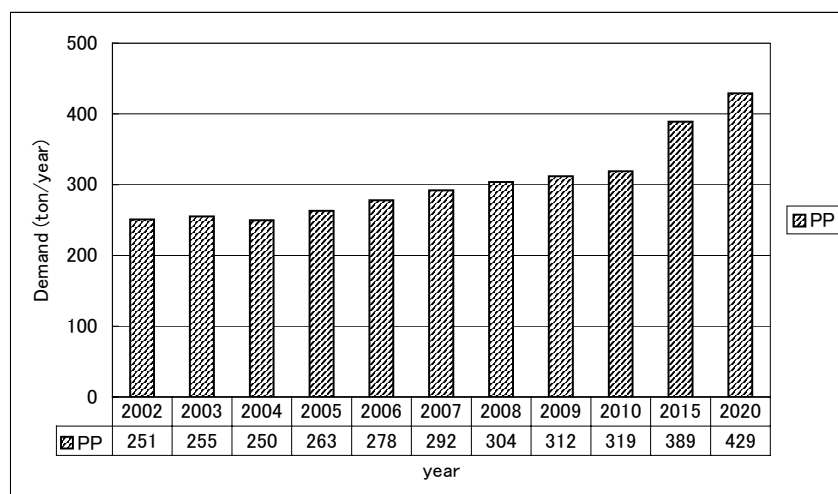
		2000	2001	2002	2003	2004
Import	Polyethylene (PE)	112	237	3,516	582	1,136
	Polypropylene (PP)	283	149	365	580	185
	Polystyrene (PS)	204	29	29	17	360
	Polyvinyl-chloride (PVC)	4,276	5,951	9,384	6,502	6,928
	Others	366	336	1,996	790	6,791
	Total	5,240	6,699	15,289	8,471	14,900
Export	Polyethylene (PE)	466	467	1,128	2,215	4,613
	Polypropylene (PP)	471	1,046	150	48	890
	Polystyrene (PS)	7,550	7,568	5,323	3,685	8,101
	Polyvinyl-chloride (PVC)	166	739	262	796	286
	Others	8,131	1,367	12,518	18,400	30,485
	Total	16,785	19,780	19,380	25,144	44,476

Source: National Statistic Office



Source: PPIA

Figure 2.4.6 Forecast of Polyethylene (PE) Demand



Source: PPIA

Figure 2.4.7 Forecast of Polypropylene (PP) Demand

(1) Polyethylene (PE) & Polypropylene (PP)

There are three companies producing Polyethylene and Polypropylene as shown in Table 2.4.18. Even though the capacity of these plants is not so small, productions of Polyethylene and Polypropylene in 2003 in those plants combined were only 84 thousand ton and 119 thousand tons, respectively. The reasons for such a low operation rate is slowing down of domestic demand and high price of raw material resin.

Main destinations for those compounds are South Korea, Singapore and Thailand, which account for around 50% of the export. Main usage, or about 50% of usage, of PE and PP resin are film for packaging of foods.

Table 2.4.18 Capacities of Polyethylene and Polypropylene in the Philippines
(Unit: 1,000 ton/year)

Company	Product	Capacity
Bataan Polyethylene	PE	250
JG Summit	PE	180
	PP	180
Petrocorp	PP	225

Source: Philippines Business Handbook

(2) Polyvinyl Chloride (PVC)

There is only one company manufacturing polyvinyl chloride, and the production was 89 thousand tons in 2004. The company dominates domestic market with market share of around 90%, which is quite higher than other petrochemical products. However supply of Vinyl Chloride Monomer (VCM), which is the raw material of the Polyvinyl Chloride, relies on the import from foreign countries. Exportation in large quantity cannot be expected.

Table 2.4.19 Production, Import and Export and Demand of Polyvinyl Chloride Resin
(Unit: thousand ton)

			2001	2002	2003	2004	2005
Resin	Production	Multipurpose Products	82.4	93.0	100.8	82.4	82.0
	Import	Multipurpose Products	8.9	10.5	8.7	9.3	6.5
		Special products	3.2	4.2	2.7	6.1	2.7
		Sum	12.2	14.7	11.4	15.4	9.2
	Export	Multipurpose Products	2.0	7.4	8.7	1.0	0.1
	Demand (A)		92.5	100.3	103.5	96.9	91.2
Final product	Import (B)		20.4	19.7	19.5	20.2	27.8
Total demand	(A)+(B)		112.9	120.0	123.5	117.1	119.0

Source: Philippines Business Handbook

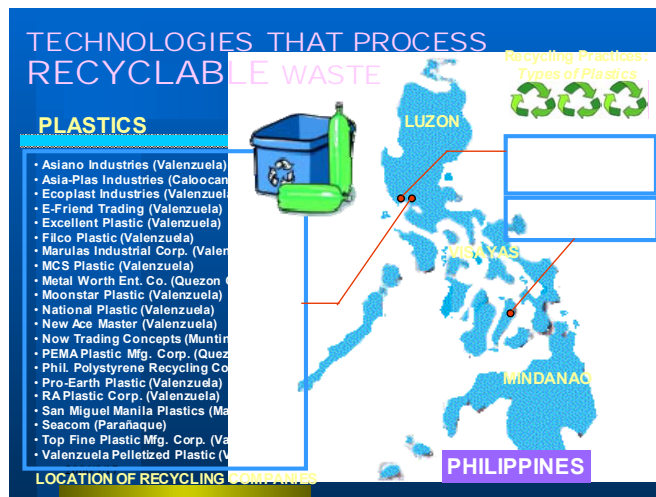
(3) Polystyrene (PS)

The Philippines has three manufacturing companies for Polystyrene. However, at this moment, only CHERMREZ (D&L) continues to produce the Polystyrene resin. Total domestic production is around 30-34 thousand ton per year. Just as the other plastic resin, the industry relies on import for the supply of the raw material, styrene monomer. In addition, due to its small-scale operation in international market, competition with foreign countries has become very hard. In terms of engineering plastics like ABS resin, there is no domestic production in the Philippine.

In the meantime, plastics processing industry has approximately 200 local companies. Local Chinese is dominant of the industry.

Plastics resin industry has a structure relying on domestic consumption. Followings are issues identified during interview and literature surveys.

- Naphtha cracking project has not been realized yet. Thus, all raw materials, including olefins, are imported, which raise the cost for raw materials. The products have little competitiveness so that there is almost no export.
- Capacity of PE and PE plant is between 180 and 250 thousand ton per year, which is not small. However operation rate stays only at 50% or so in recent years. Moreover the plant often stops its operation because of low domestic demand.
- Polystyrene companies rely on import for supply of raw material, styrene monomer.



Source: National Solid Waste Management Commission

Figure 2.4.8 Location of Major Waste Plastic Recyclers in the Philippines

2.4.6 Recycler of Used Electrical Home Appliances and PCs

The Australia based HMR group is operating a recycling business called, “Full Service Asset Management Company.” The group takes or buys overstocked or obsolete properties, including PCs, home appliances, office equipments, furniture and etc. The company sells those goods for recycling or as used products after repairs and reclaims. The company dismantles the taken-back properties, which are not able to reclaim, and recycles the recyclable materials.

HMR Envirocycle Philippines, Inc., established in March 2003 as a central treatment plant of HMR group, collects the overstocked or obsolete properties of customers locally and imports used PCs mainly from Australia. Their customers are offices, factories, banks, schools, and, junkshops, as well as collective collection event like the Earth day collection event by LGUs.

Regarding used PCs, the company, for instance, buy or takes back used PCs when a customer replaces his/her PCs for newer model. Price of the used PC depends on year, model, and CPU types. The company then tests the PC to see if the unit can be repaired or should be dismantled/recycled. When the company finds the PCs are not able to or not worth of reclaim, various parts like printed circuit board, IC parts, base metal and plastics are separate and recovered. The printed circuit board and IC parts that contain relatively large in quantity of gold plating can be sold at high price. These printed circuit board and IC parts are exported to Singapore, Malaysia, South Korea and others.

The PCs CRT monitors are crushed by a special CRT crusher, which is operated in a closed system so that any dusts containing lead and other heavy metals can be collected before diffusing. Those dusts are collected by high efficiency HEPA filter. The crushed CRTs (glass panels) are exported to South Korea for the further treatment. The company has baler, press shredder machines and CRT crusher

The company also handles other recyclable materials, like waste papers, waste Styrofoam and used home appliances, to sell to local recyclers. The company has looked into a possibility of recycling of rechargeable batteries in the IT equipments like cell phones and tried to set up a collection system. At that time the project was cancelled because there was not strong collection routes and enforcement by DENR was weak. The company pointed out that Extended Producers Responsibility is necessary for the recycling of cell phone batteries.

2.4.7 External Condition of the Recycling Industry in the Philippines

In the recycler and end-users surveys in August and September of 2006, several conditions that the recycling industry encounters now are mentioned. Issues and problems affecting cost structure and compositeness are summarized as follows.

(1) Electricity price

Electricity price in the Philippines is one of the highest among the Asian countries - second highest following Japan. Table 2.4.20 shows the electricity retail price of the MERALCO, which is the electricity distribution company in the Metro Manila area.

The price was fairly low in the past, but when the Philippine government introduced policy measures for independent power producers (IPPs) in 1990s in order to dissolve chronic electricity shortage, which had been common from 1980s to 1993, electricity price soared. It can be said that this policy measures lead to the higher electricity price.

Table 2.4.20 Comparison of Average Electricity Price between Eastern Asia and ASEAN countries

(Unit: US Cent/kWh)

	Philippine	Japan	Indonesia	Vietnam	Thailand	Malaysia	China	Korea
Electricity Price	10.9	13.3	3.2	4.81	5.88	6.05	4.77	5.69
Electricity Company	MERALCO	Average of ten companies	PLN	EVN	MEA	TNB	CNEC	KEPCO

Note: MERALCO; The Manila Electric Company, PLN: Perusahaan Listrik Negara, EVN: Electricity of Vietnam, MEA: The Metropolitan Electricity Authority, TNB: Tenaga Nasional Berhad, CNEC: China National Electric Company, KEPCO: Korea Electric Power Corp.

Source: JICA study report

As indicate in Table 2.4.21, the prices are almost same among commercial entities, industry and residence. Nighttime price, which is cheaper than daytime price in Japan, does not exist in its pricing system in the Philippine.

Table 2.4.21 Comparison of Average Electricity Price between MERALCO and Japanese Electricity Company

(Unit: PhP/kWh)

	Customer		
	Residential	Commercial	Industrial
MERALCO	4.87	4.88	4.33
Japan (TEPCO) (from January to December in 2001)	9.62	6.43	5.56

Note: TEPCO; TOKYO ELECTRIC POWER COMPANY

Source: JICA study report

(2) Increasing cost by the sea transportation of the scrap

The cost structure of domestic transportation industry is high because of delay of infrastructure building, restriction of foreign investment, and monopoly of the local companies. In our survey, the study team learned that the cost of the sea transportation of the wastes and scraps are one of the major burdens for the recyclers and end-users.

Bulk freight is usual for the transportation of iron/steel scrap. However since the waste paper and waste plastics are bulky, they are transported by container cargo, in general, after reducing volume by pressing. In case of waste paper transportation, the 20-foot container is used.

About 12 ton of cargo can be loaded in a 20-foot container. Table 2.4.22 shows the freight price of the major sea transportation between Manila and Cebu or Davao. Assuming the price between Manila and Davao is a 40 thousand PhP, the unit cost per ton of waste paper is calculated as follows:
 $40,000 \text{ PhP} / 12,000 \text{ kg} = 3.3 \text{ PhP/kg}$

In the meantime, according to PULPAPEL, the purchasing prices by the paper mills in the Metro Manila are shown in Table 2.4.23. It is hard for the paper mills to shoulder only freight cost which is 3.3 PhP/kg. In case of waste paper export in Japan, the cost for freight to CIF Shanghai is only 1 to 1.5JPY /kg which is equivalent to approximately 0.4 to 0.6 PhP/kg.

Table 2.4.22 Domestic ocean freight cost

(Unit: PhP)

	Container Size	Company A		Company B		Company C	
		Class B	Class C	Class B	Class C	Class B	Class C
Davao to Manila (Pier to pier)	10 feet	25,882	15,317		NA	NA	NA
	20 feet	51,758	30,626		40,000	59,481	41,292
	40 feet	103,429	61,166		80,000	NA	NA
Cebu to Manila (Pier to pier)	10 feet	16,384	10,000		NA	NA	NA
	20 feet	32,752	20,112		27,000	30,486	25,599
	40 feet	65,420	40,125		54,000	NA	NA

Note: Data from interview survey

Table 2.4.23 Purchasing Prices by the Paper Mills in the Metro Manila

Calculated unit cost of sea transportation between Manila and Davao		3.3 PhP/kg
Purchasing price by the paper mills located in Metro Manila	ONP	7-8 PhP/kg
	OCC	4-5 PhP/kg
	White paper	11-14 PhP/kg
	Mixed paper	2.4-3.5 PhP/kg

According a steel scrap trader in Cebu, domestic transportation cost is approximately 1,600 PhP/ton (1.6 PhP/kg). Table 2.4.22 gives details of the cost. Current selling price of the steel scrap at the ERF companies is around 2 PhP/kg. This gives the domestic transportation cost account for 13% of the selling price. If the selling price can not run up, the transportation cost have to be shouldered by the parties are involved in the steel scrap trading like generators and intermediate traders.

**Table 2.4.24 Domestic Transportation Cost of Steel Scrap
(Ocean transportation + land transportation)**

Land transportation Warehouse→Port Port → Paper Mill	Handling and unloading at the Port	Ocean freight	Other cost	Total
400	400	700	100	1,600 PhP/ton

Note: Data from interview survey

In neighboring ASEAN countries, the governments, in the recent years, has been constructing expressways, airports and port facilities and establishing the domestic logistic network. Eventually they enhance the international competitiveness. However, the Philippine plays second fiddle from these countries, as the ports except Manila cannot handle a great deal of containers. It is necessary to proceed mechanizing the container ports at Batangas in the Luzon and Davao in the Mindanao.

(3) Labor cost

Recyclers and end-users frequently claim that labor cost in the Philippine is same or even higher than that of neighboring countries. According to a JETRO survey conducted in November 2004 on comparison of investment cost in the major cities and area in the Asia, minimum wage designated by law in the Philippine was 4.2 US\$/day which was almost as same as Thailand's. The Philippine was, indeed, higher than Jakarta, Hanoi and Ho Chi Minh City. In addition, the RTWPB raised the minimum wage in July and August of 2006 to match with the inflation caused by recent increase in crude oil price. Eventually the minimum wage in the Metro Manila, except agriculture sector, have increased to 350 PhP/day which is about 7 US\$/day.

Table 2.4.25 Comparison of Labor Wage of Workers

Nation	Minimum wage
Philippines (Manila)	4.21US\$/day
Philippines (Cebu)	3.69US\$/day
Taiwan (Taipei)	482.78 US\$/month (482.78÷30=16.1US\$/day)
Singapore (Singapore)	No provisions
Thailand (Bangkok)	4.21US\$/day
Malaysia (Kuala Lumpur)	No provisions
Indonesia (Jakarta)	75.03 US\$/month (75.03÷30=2.50 US\$/day)
Vietnam (Hanoi)	39.83 US\$/ month (39.83÷30=1.33 US\$/day)
India (New Delhi)	61.84 US\$/ month (61.84÷30=2.01 US\$/day)
Japan (Yokohama)	6.72 US\$/hour

Note: Calculation from monthly wage to daily wage is done by the JST.

Source: JETRO

(4) Import duties on products and recyclable materials

Members of ASEAN including the Philippine have been gradually decreasing the customs duty on tariff from 1993 in accordance with “Common Effective Preferential Tariff Agreement, CEPT” in order to realize the ASEAN FREE TRADE AREA, or AFTA. As of June 2004, the goods applying CEPT, which was between 0 and 5 %, account for 98.6% of all imported goods in the Philippine. In addition, the member countries are requested to abolish the customs among the ASEAN nations by 2010. For example, the customs on the paper and paperboard products was 17.5% on an average⁵ before; however, present customs for the countries applying to CEPT rate are 0 to 5%. Correspondingly, the customs on scrap and recyclable waste have decreased.

It is expected that trade exploiting the CEPT will open up among the ASEAN countries. Eventually cheap and high quality goods will be imported from ASEAN countries; consequently, the Philippine industry related to recycling may be involved in international competition in the ASEAN.

Furthermore, custom officers do not always conduct import inspection properly, in addition to false declaration that the import traders make on their goods as cheaper customs goods. Infestation of smuggling should also be pointed out.

⁵ Philippine Business Handbook

Table 2.4.26 Duty on Recyclable Materials

	Description	Year	Rate of Duty (%)		
			MFN	CEPT	
Waste paper	- unbleached Kraft paper or paperboard or corrugated paper/paperboard	2004	1	0	
		2005	1	0	
	- other paper or paperboard of bleach chem. Pulp not colored in mass	2004	1	0	
		2005	1	0	
	- paper or paperboard of mechanical pulp	2004	1	0	
		2005	1	0	
	- other paper or paperboard including unsorted waste and scrap	2004	1	0	
		2005	1	0	
Waste plastics	- of polymers of ethylene	2004	5	0	
		2005	5	0	
	- of polymers of styrene	2004	5	0	
		2005	5	0	
	- of polymers of vinyl Chloride	2004	1	0	
		2005	1	0	
	- of other plastics	2004	5	0	
		2005	5	0	
	- others	2004	5	0	
		2005	5	0	
	Glass Cullet	- Cullet and other waste and scrap of glass; glass in the mass	2004	1	0
			2005	1	0
Iron scrap	- waste and scrap of cast iron	2004	0	0	
		2005	0	0	
	- waste and scrap of stainless steel	2004	3	0	
		2005	3	0	
	- waste and scrap of tinned iron steel	2004	3	0	
		2005	3	0	
	- waste and scrap of shavings, chips and etc	2004	3	0	
		2005	3	0	
	- remelting scarp ingots	2004	3	0	
		2005	3	0	
Aluminum waste & scrap		2004	1	0	
		2005	1	0	

Source: Philippine Tariff Commission Tariff and Custom Code of the Philippine
(The ASEAN Harmonized Tariff Nomenclature)

2.5 Recycling Market and Pricing Mechanisms

Price of recyclable waste is discussed in the following section.

2.5.1 Primary Collection

(1) Price Standardization by Junkshops of LINIS-GANDA Members

Table 2.5.1 shows an example of standardized prices for recyclable wastes by junkshops of LINIS-GANDA members. These prices are for the primary collection stage. Comparing to the price of the waste in 2003 and 2006, the prices in 2006 are generally higher than the prices in 2003. For the waste papers, newspaper become 2.7 times higher while cardboard is 1.5 times higher in 2006. For waste plastics, HIPS plastic cup is 4 times higher whereas PET bottle is 10 times higher

in 2006. For scrap iron/steel, it is 7 times higher and stainless recorded 4.3 times higher. As for non-ferrous metals, aluminum kitchenware, aluminum can, and copper are 2.5 times, 2.7 times, and 4 times higher, respectively.

The price of PET has seen considerable increase. The price in 2006 is 10-20 times higher than the prices of PE and PVS in 2006. According to Philippine Plastic Industry Association (PPIA), large amount of used PET bottle is exported to China, which brings an impact on the increase of the PET price. On the other hand, the price of glass bottle does not show much difference between 2003 and 2006, which maybe resulted by the fact that almost no glass cullet has been exported.

Meanwhile, the price of iron/steel scraps⁶ of Japan in 2006 is approximately 9.5 PhP/kg, which is almost same as the price of LINIS-GANDA. In case of waste paper, the average price of newspaper of Japan in October 2006 is between 2.8-3.6 PhP/kg and cardboard was between 2.4-3.2 PhP/kg. It is also same level as the LINIS-GANDA.

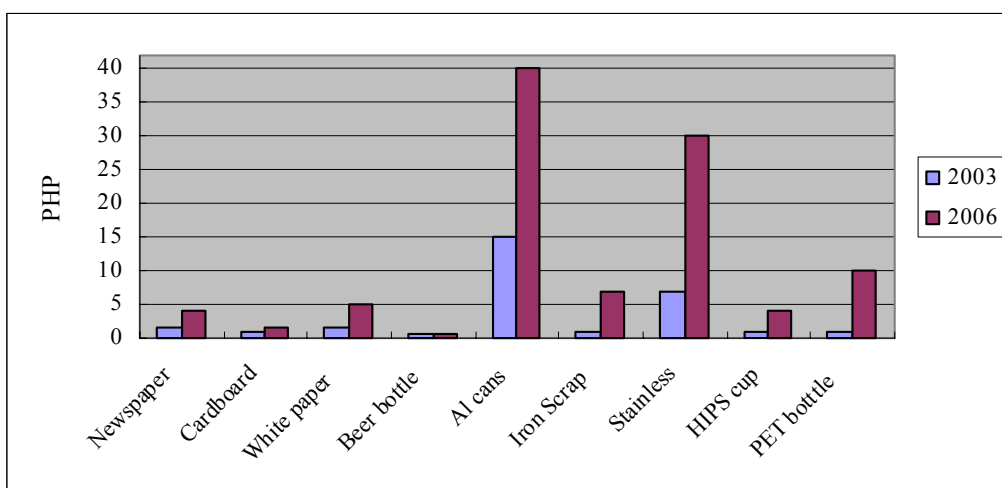
Table 2.5.1 Comparison of Price of Recyclable Waste by Linis-Ganda (Year2003 vs. Year2006)

Type	Price		Type	Price	
	2003	2006		2003	2006
Paper			Metal/ Tin/ Aluminum		
1. Assorted paper		P0.7/kg*	1. Al caldero (kitchenware)	P8/kg	P20/kg
a. folder	P40/kg		2. Al cans	P15/kg	P40/kg
b. news print	P40/kg	P1/kg*	3. Al hard	P15/kg	P40/kg
c. scratch paper	P40/kg		4. Al jalously (window sash)	P25/kg	P45/kg
d. receipt w/o carbon	P40/kg		5. Iron Scrap	P1/kg	P7/kg
2. Newspaper	P1.5/kg	P4/kg	6. Steel Cans	P0.2/kg	P1/kg
	P12/dangkal	P20/dangkal	7. Stainless	P7/kg	P30/kg
3. Cardboard	P1/kg	P1.5/kg	8. Brass	P25/kg	P60/kg
4. Magazine	P3/dangkal	P1/kg	9. Copper	P30/kg	P120/kg
5. Selected paper (white)	P1.5/kg	P5/kg	10. Fender (tapalodo)	P0.5/kg	P3/kg
			11. Washers (tingga)	P5/kg	P5/kg
Glass Bottle			12. GI sheet	P0.25/kg	P4/kg
1. Broken bottle			13. Zinc		
a. white	P0.3/kg	P0.3/kg			
b. colored	P0.2/kg	P0.2/kg	Ink Cartridge of PC printer		
2. Beer bottle	P0.5/kg	P0.5/kg	1. Big cartridge	P10/pc	
3. BFS	P0.25/kg	P0.4/kg	2. Small cardtridge (inkjet)	P15/pc	
4. Catsup (UFC small bottle)	P0.3/kg	P0.25/kg			
5. Catsup (UFC big bottle)	P0.2/kg	P0.2/kg	Car batteries		
6. Medicine bottles	P0.1/kg	P0.2/kg	(acid-lead batteries)		
7. Tanduay (rum) bottle	P0.5/kg	P0.5/kg	1. 1SNF	P15/kg	P15/kg
8. Gilbey's bottle (small)	P0.25/kg		2. 1SMF	P15/kg	P25/kg
9. Gilbey's bottle (big)	P0.5/kg		3. 2SM	P35/kg	P35/kg
10. Gin bottle	P0.5/kg	P0.5/kg	4. 3SM	P40/kg	P45/kg
11. Grande bottle	P1.0/kg	P1.5/kg	5. 6SM	P75/kg	P150/kg
12. Emperador bottle	P0.5/kg	P0.5/kg	6. 2D	P105/kg	P200/kg
13. Litre bottle (soft drinks)	P1.5/kg	P3/kg	7. 4D	P115/kg	P220/kg
14. Long neck bottle	P1.0/kg	P1.0/kg	8. 8D	P145/kg	P300/kg

⁶ H2, Kanto area

Type	Price		Type	Price	
	2003	2006		2003	2006
15. Nescafe (medium-bottle)	P0.5/kg	P0.5/kg			
16. One gallon bottle	P3.0/kg		Plastics		
17. Shoktong bottle	P0.5/kg	P0.5/kg	1. HIPS plastic cup	P1/kg	P4/kg
18. Silver swan bottle	P0.5/kg	P1/kg	2. PE transparent	P0.2/kg	P0.2/kg
19. Soft drinks bottle	P0.75/kg	P0.75/kg	3. PET plastic bottle	P1/kg	P10/kg
20. Vinegar small bottle	P0.35/kg		4. PVC (tube or bottle)	P1/kg	P1/kg
21. Vinegar big bottle	P0.8/kg		5. Hard plastic	P2/kg	P8/kg
22. Soy sauce bottle	P1/kg	P1/kg			
23. Whisky bottle	P1/kg	P1/kg			

Source: Metro Manila Solid Waste Management Project, Final Report Junk Shop Survey, June 2003, DENR, ADB



Note: Data from interview survey

Figure 2.5.1 Comparison of Prices of LINIS-GANDA between 2003 and 2006

(2) Group Collection of Recyclable Waste in Barangay Luz, Cebu

Table 2.5.2 shows the prices of recyclable waste collected by group collection in Barangay Luz, Cebu. Comparing to the prices of LINIS-GANDA, the prices of newspaper and iron/steel scrap are cheaper in Barangay Luz, Cebu. The prices of PET are between 7-15 PhP/kg, which is almost same as Manila. The price of aluminum can is also same as the price in Manila.

Table 2.5.2 Prices of Recyclable Waste of Group Collection in Barangay Luz, Cebu

Type	Price	Type	Price
Aluminum		Newspaper	1.0 PhP/kg
Thin	40.0 PhP/kg	Local	1.5 PhP/kg
Thick	50.0 PhP/kg	National	0.5 PhP/kg
Can	40.0 PhP/kg	Assorted carton	
Copper		Glass bottle	
Yellow brass	55.0 PhP/kg	Long neck	1.0 PhP/pc
Red copper	65.0 PhP/kg	Short neck	0.75 PhP/pc
		Kulafu (Liquor)	0.5 PhP/pc
Lead		Jr Lapad (Liquor)	0.5 PhP/pc
Washer	10.0 PhP/kg	Patis/mallorca (catsup)	0.8 PhP/pc
		Catsup	0.25 PhP/pc

Type	Price	Type	Price
Steel/iron		Garapa (catsup)	0.2 PhP/pc
Iron scrap	5.0 PhP/kg	Efficasent (medicine)	0.5 PhP/pc
Car plate	3.0 PhP/kg	Coke/Pepsi (1litro)	2.5 PhP/pc
		Coke regular	1.0 PhP/pc
PET bottle		San Miguel Grande	2.5 PhP/pc
Blowing	7.00 PhP/kg	San Miguel Pilsen	1.0 PhP/pc
Natural spring (brand name)	15.0 PhP/kg		

Source: Barangay Luz, Cebu 2006, August

(3) Prices at Recyclable Collection Event (RCE)

Table 2.5.3 shows the prices of recyclable waste at the Recyclable Collection Event (RCE) in Makati City on September 8th, 2006, hosted by Makati City. DENR, PBE, and Ayala Foundation participated in this event as joint hosting. Comparing to LINIS-GANDA prices, the prices were generally higher on the waste paper and aluminum can while PET was same

Table 2.5.3 Price list of “The Ayala Center Waste Trading Market, Sep. 8 2006”

Recyclable materials	Condition	Price
Newsprint	Old newsprint, newspaper, magazines no over than 8 months printed date	5.5 PhP/kg
White ledger	White paper, used bond papers, computer papers, white notebook	8.5 PhP/kg
Old corrugated cartons	Brown carton boxes	3.5 PhP/kg
Aluminum can		55.0 PhP/kg
PET Bottles		15.0 PhP/kg
Transformer oil (Mineral)	80-100 %	8.0 PhP/L
	50-79 %	3.50 PhP/L
Hydraulic oil	80-100 %	7.50 PhP/L
	50-79 %	3.00 PhP/L
Mineral/vegetable oil/spindle oil	80-100 %	6.0 PhP/L
	50-79 %	2.50 PhP/L
Motor oil/lube oil / solvent / gear oil	75-100 %	5.0 PhP/L
	50-74 %	2.00 PhP/L
PC	CPU complete	160 PhP/unit
PC	CPU, no HDD, RAM with power supply	80 PhP/unit
Colored monitor	14”, 15”, 17”	35 PhP/unit
Monochrome monitor		No value
Laser Jet/Dot matrix printer complete		15 PhP/unit
Desk Jet printer/ FAX/ Scanner		15 PhP/unit
Other office equipment		3 PhP/kg
Motherboard /PC cards / Telecom cards		80 PhP/kg
Printer board/ Medium grade board		20 PhP/kg
Power boards/ Monitor boards		5 PhP/kg

Recyclable materials	Condition	Price
FDC drive/ CD ROM/ Power supply		8 PhP/kg
CPU case		3.00 PhP/kg
Plastics		1.50 PhP/kg
Base metal	Aluminum, stainless	20 PhP/kg
Wire, cables	Copper	7.00 PhP/kg

Source: The Ayala Center Waste Trading Market, Sep. 8 2006

2.5.2 Prices at Scrap Dealers

Following two price lists are the price list of scrap dealers that handle mainly metal scrap and waste plastics.

Table 2.5.4 Price list of Dealer A (August 2006)

Type	Price	Type	Price
Iron scrap (solid)	11.60	Jalousy (Aluminum window sash)	80.0
Iron scrap (assorted)	11.20	Condenser (Air conditioning)	80.0
Iron scrap (light)	10.50	Caldero (Aluminum kitchen ware)	50.0
		Al can (soft drinks and beer)	60.0
Steel drum with cover	10.50	Al cap (soft drinks can and beer)	20.0
Tin plate	10.40	Zinc (mainly die-cast)	55.0
Tin can	7.40	Stainless	55.0
		Transparent PET bottle (clean)	25.5
Copper		Transparent PET bottle (dirty)	22.0
Class A	190.0	Green PET bottle no cap (clean)	15.0
Class B	180.0	Green PET bottle no cap (dirty)	9.0
Class C	170.0		
Brass	145.0		
Radiator (Car etc)	80.0		
Aluminum			
Heavy (Big size)	75.0		
Light (small size)	70.0		

Note: above price are delivered to dealer's warehouse, Price list effective August 19 2006

Class A: Electric wire, Class B: Electric wire (coating and insulation removed), Class C: Motor coil

Aluminum Heavy: Large die-casting product, vehicle engine, car wheel etc

Condenser: air conditioner of vehicle use and home use

Table 2.5.5 Price list of Dealer B (August 2006)

Type	Price	Type	Price
Copper A	320	Bronze	250
Copper B	305	Lead washer (hard)	35
Copper C	290	Lead washer (soft)	34
Brass	180	Bronze cutting chips	150
Radiator	135	Iron scrap mixed	11.7
Al can	75	Iron scrap solid (sheet)	12.1
Al light	84	Cast iron	—
Al heavy	84	Tin plated steel sheet	10.1
Jalousy	90	Tin can	7.2
Caldero (Al kitchenware)	75	Steel cuttings	—
Al cap	40	Stainless	85

Type	Price	Type	Price
Al sheet	84		
Condenser	160	Car batteries (acid lead batteries)	
Aluminum wire	—	1SNF	113
Dismantled condenser	80	2SM	170
Al cuttings	40	3SM	214
Zinc (mainly die cast)	85	6SM	280
		2D	370
		4D	440
		8D	590

Since air conditioning unit contains a quite large amount of copper and aluminum, discarded air conditioning unit is marketable. Prices of discarded air conditioner and refrigerator are between 12-15 PhP/kg, and price of discarded washing machine is approximately 8 PhP/kg. In the meantime, discarded TV is not marketable since it contains large amount of glass, especially lead glass.

2.5.3 Conditions of Supply and Demand of the Recyclable Wastes in the International Market.

(1) Iron/Steel Scrap

1) International supply and demand

World steel production was approximately 750 million tons in 1996. The production increased 1.5 times and reached 113 million ton in 2005. Especially, a significant increase can be seen after year 2003 due mainly to China's expansion of its steel production. The steel production of China in 2001 was 150 million tons, but it grew to 350 million tons - more than a double, in 2005. China now accounts approximately 30 % of the world steel production.

Countries and areas of scrap steel/iron exporter can be divided into CIS/Eastern Europe, Western Europe, Japan, and US. Traditionally, export and import in Western Europe are fairly balanced. CIS/Eastern Europe, however, is excess of exporters, while Asian and North America are excess of importers.

Table 2.5.6 Crude Steel Production in ASEAN Countries and in the World

(Unit: 1,000 ton)

	Japan	China	S.Korea	Taiwan	Indonesia	Thailand	Malaysia	Singapore	Philippine	ASEANS	USA	World
1996	98,801	101,237	38,903	12,350	4,109	2,143	3,216	531	920	10,919	95,535	750,016
1997	104,545	108,911	42,554	16,056	3,816	2,101	2,962	383	980	10,242	98,485	798,950
1998	93,548	114,588	39,896	16,965	2,699	1,814	1,903	499	880	7,795	98,658	777,311
1999	94,192	123,954	41,042	15,438	2,891	1,532	2,770	590	530	8,313	97,427	788,962
2000	106,444	127,236	43,107	16,896	2,848	2,100	3,650	603	426	9,627	101,803	847,662
2001	102,866	150,906	43,852	17,261	2,781	2,127	4,100	456	500	9,964	90,104	850,338
2002	107,754	182,249	45,390	18,230	2,462	2,538	4,722	460	550	10,732	91,587	903,785
2003	110,511	222,413	46,310	18,832	2,042	3,572	3,960	561	500	10,635	93,677	969,338
2004	112,716	280,500	47,521	19,536	2,400	4,500	5,700	610	400	13,610	99,680	1,066,457
2005	112,473	349,362	47,770	18,567	-	-	-	-	-	-	93,285	1,129,268

Source: Japan ferrous raw materials association

Table 2.5.7 Supply and Demand of Iron/Steel Scrap in the Major Asian Countries (2004)

(Unit: 1,000 ton)

	Japan	China	S.Korea	Taiwan	Malaysia	Thailand	Vietnam	Indonesia
Supply	Domestic	50,000	18,375	8,226	1,900	3,942	718	752
	Import	261	7,548	3,800	3,723	1,850	163	1,399
	Sum	49,959	60,023	25,923	12,025	5,792	881	2,151
Demand	Steel making	40,354	24,082	11,079	NA	5,036	853	1,760
	Cast iron, foundries	6,540	1,617	NA	NA	600	27	206
	Sum	46,894	25,699	11,079	NA	5,636	880	1,966

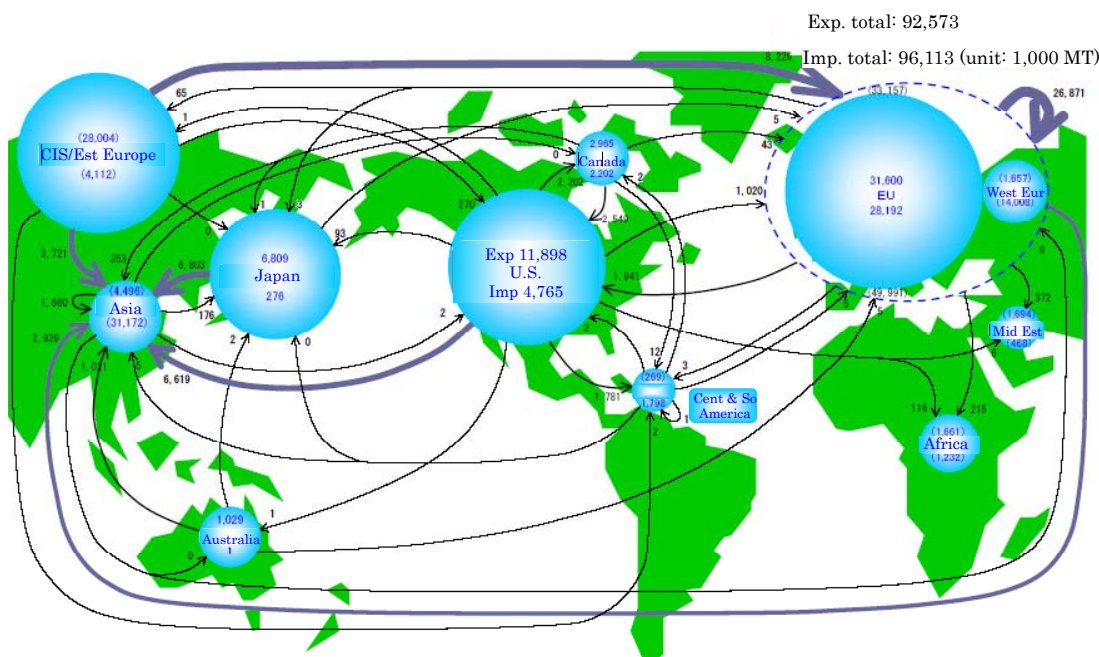
Source: Data for China is from JICA "The study on the measures for technical cooperation for building resource circulation society in Asia," 2006, all other data is from South East Asia Iron and

Steel Institute

Asian countries as a whole now import approximately 32 million tons of scrap steel/iron. Asian steel market is believed to have a growing demand on steel productions in mid- long-term because of its growth potential. In the Asian countries, China, South Korea, Taiwan and Malaysia are large scrap steel importers. In 2004, China exported 10 million tons of steel scraps while South Korea exported 7.5 million, Taiwan and Malaysia exported 3.8 million tons.

Table 2.5.7 shows the supply and demand of steel scrap in major Asian countries. In case of the Philippines, it is assumed from the production and import of billet that approximately 1,300 thousand tons were produced in 2004, even though the amount of generation is not available.

Figure 2.5.2 Circulation Flow of Iron/Steel Scrap in the world



Source: Japan Iron And Steel Recycling Institute

2) Import and export prices

There are mainly three factors influencing the fluctuation of prices of steel scrap in international market. Those factors are, 1) amount of steel scrap generated, 2) situation of scrap purchased by steel making companies, and 3) international market conditions and export. Among the factors, the purchasing amount of electric furnace steel makers, which is the largest end-user of the steel scrap, affects the local price of the scrap. Their main products are construction materials such as rods, reinforcing bars and section steels. The demand of the construction materials greatly affects the purchasing amount of electric furnace steel maker. Scrap steel generation is greatly subject to business cycle and seasonal factor as well.

As mentioned in the previous section, China is expanding the steel production in recent years. In the site visit survey, it is revealed that import of steel scrap by China, South Korea and Taiwan pushes up the international scrap price in the Philippines

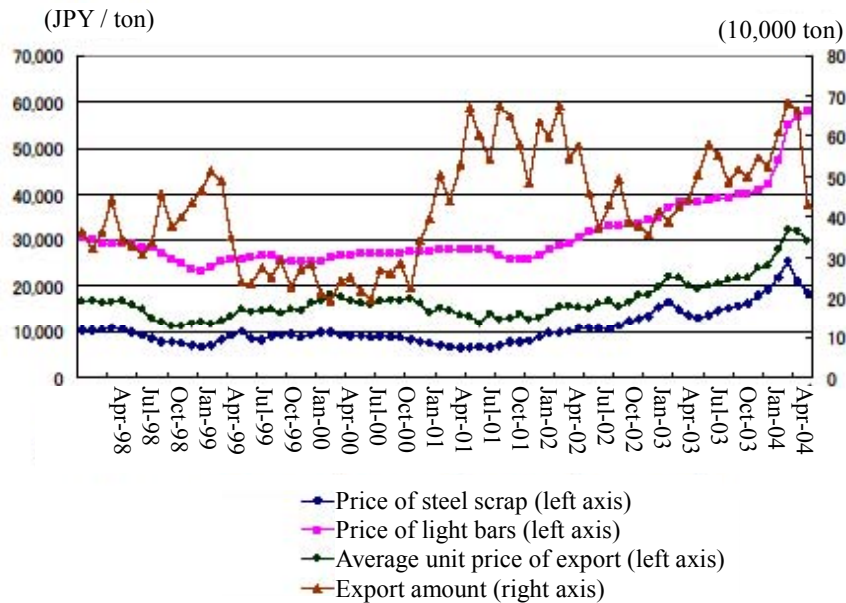
Table 2.5.8 shows the price of steel scrap (H2) in Japan. This is the delivered price of steel scrap by the dealers. The price was fluctuated between 7 and 19 thousand JPY/ton from year 1990 to year 2002. The price is apparently increasing since 2003, and in 2006 it reaches 24 thousand JPY/ton.

Table 2.5.8 Price of iron/steel scrap (H2) in Japan

(Unit: JPY/ton)

Year	Average price	Year	Average price
1990	18,800	2000	8,807
1991	14,794	2001	7,389
1992	12,308	2002	12,024
1993	14,292	2003	16,807
1994	14,325	2004	21,341
1995	12,721	2005	20,760
1996	12,292	2006	23,703
1997	13,833		
1998	9,183		
1999	8,674		

Source: Nikkan Shikyo Tsushinsha Co, Ltd



The steel scrap prices in the US, which is the world largest scrap steel exporter, is shown in the Table 2.5.9. The US composite price is the price of scrap steel in the US. This price is regarded as an indicating price of export of steel scrap. The US composite price increased from the autumn of year 2003, the price reached at 234.6 US\$/ton in July 2006. This price is almost 3.7 times higher than lowest price in November 2001 which was 63.65 US\$/ton.

Table 2.5.9 Price of Iron/Steel Scrap (Composite) in the US

(Unit; \$/MT)

	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1998	116.92	117.86	116.80	111.12	102.49	91.95	74.93	69.22	71.98	84.69	87.56	78.87
1999	79.14	86.78	90.38	88.34	93.01	94.73	94.49	101.57	109.45	112.33	104.95	102.73
2000	102.76	95.23	87.80	87.69	87.80	87.60	79.33	73.29	76.32	81.79	73.45	74.89
2001	74.64	75.05	76.11	77.19	77.10	75.42	72.10	63.65	63.73	69.80	74.56	77.47
2002	85.27	95.64	95.47	95.31	96.34	97.52	96.98	92.39	92.62	103.92	114.38	120.04
2003	115.16	105.69	102.41	107.90	117.29	123.85	125.82	139.06	153.05	177.00	219.00	234.38
2004	198.16	158.71	157.81	206.65	222.40	197.55	232.12	246.06	206.09	194.56	190.54	193.08
2005	210.18	171.56	118.93	133.08	184.15	228.47	194.62	226.91	216.15	202.98	222.03	224.41
2006	231.34		238.47	234.46	-	-	-	-	-	-	-	-

Note: Unit of original data is US\$/LT. It is converted to US\$/MT calculating LT=1.016 MT

(2) Waste Papers

1) Supply and demand

Production and consumption of paper and cardboard in 2004 are summarized in Table 2.5.10. The US is a largest producer of paper and cardboard, it produces 83.4 million ton. China is the second and Japan is in the third place. The production of these three countries makes up 45% of world production.

It should be noted that China has been expanding its production by 10% annually since 2000. It is believed that China will overreach the US in the near future.

The US is the largest waste paper producer as well as the largest waste paper exporter. In Asian countries, Japan, Singapore and Hong Kong export the waste papers. There is almost no paper industry in Singapore and Hong Kong, who import the waste paper and export to China.

Table 2.5.11 shows the consumption and import of waste paper in China. China is increasing its waste paper import since 2000.

Table 2.5.10 Production of Paper and Paperboard in the World (2004)

Rank	Nation	Production (1,000 ton)	Ratio	Consumption (1,000 ton)	Consumption per capita (kg/person)	Population (1,000)
1	US	83,401	23.2%	92,257	312.0	295,734
2	China	49,500	13.8%	54,392	41.6	1,306,314
3	Japan	30,889	8.6%	31,426	246.6	127,417
4	Canada	20,461	5.7%	7,299	222.5	32,805
5	Germany	20,392	5.7%	19,442	235.9	82,431
6	Finland	14,036	3.9%	1,489	285.1	5,223
7	Sweden	11,589	3.2%	2,276	252.8	9,002
8	Korea	10,511	2.9%	8,243	170.2	48,423
9	France	10,249	2.9%	11,079	182.7	60,656

Rank	Nation	Production (1,000 ton)	Ratio	Consumption (1,000 ton)	Consumption per capita (kg/person)	Population (1,000)
10	Italia	9,665	2.7%	11,334	195.1	58,103
11	Brazil	8,422	2.3%	7,303	39.2	186,113
12	Indonesia	7,678	2.1%	5,408	22.3	241,974
13	Russia	6,789	1.9%	4,933	34.4	143,420
14	Great Britain	6,240	1.7%	12,678	209.8	60,441
15	India	6,229	1.7%	6,968	6.5	1,080,264
16	Spain	5,527	1.5%	7,194	178.3	40,341
17	Austria	4,852	1.3%	2,088	255.1	8,185
18	Taiwan	4,801	1.3%	5,187	226.6	22,894
19	Mexico	4,349	1.2%	6,137	57.8	106,203
20	Thailand	3,600	1.0%	1,191	51.0	65,444
~						
33	Philippine	962	0.3%	1,377	15.7	87,857
	World total	359,599	100.0%	357,754	55.6	6,430,085

Source: Kosi Journal

Table 2.5.11 Consumption of Waste Paper in China

(Unit: 10,000 ton/year)

	1990	1995	2000	2001	2002	2003	2004
Waste paper Domestic collected	371	767	843	800	1,070	1,170	1,321
Waste paper imported	21	73	297 (338)	510 (642)	550 (687)	750 (938)	984 (1,229)
Total	392	840	1,140	1,310	1,620	1,920	2,305

Note: figures in () are from Koji Journal, the other data is from Kamigyō Times

Source: Kosi Journal, Kamigyō Times

2) Prices

Table 2.5.12 shows the purchasing price of waste papers by waste paper warehouse in Kanto region of Japan. From about year 2000, China increased its import of the waste paper to secure their raw materials. Around the same time, the purchasing price of the waste paper by paper warehouse started to increase in Japan.

Table 2.5.12 Purchasing price of waste papers in Kanto area in Japan

(Unit: JPY/kg)

YY/MM	Cardboard	Newspaper	Magazine
1992/12	9 - 10	7 - 8	2 - 3
1993/12	7 - 8	6 - 7	1
1994/12	6 - 7	6 - 7	1 - 2
1995/12	9 - 10	8 - 10	3 - 5
1996/12	6 - 7	7 - 8	1 - 2
1997/12	2 - 3	3 - 4	- 2 - 0
1998/12	2 - 3	3 - 4	- 2 - 0
1999/12	2 - 3	4 - 5	2 - 3
2000/12	4 - 5	4 - 5	2 - 3
2001/12	1 - 2	2 - 4	0 - 1

YY/MM	Cardboard	Newspaper	Magazine
2002/12	3 - 5	6 - 7	2 - 3
2003/12	4 - 7	6 - 8	3 - 5
2004/12	4 - 7	6 - 8	3 - 5
2005/12	4 - 7	6 - 8	3 - 5
2006/10	6 - 8	7 - 9	4 - 5

Note: Code price: Collector bring steel scrap into warehouse, unit is JPY/kg

Source: Kosi Journal

Table 2.5.13 shows the bidding price of export of waste paper by the Kanto paper warehouse association. Almost all export destinations are China, including Shanghai port. Similar to the local waste paper price in Japan, the export price of the waste paper has increased from about year 2002.

Table 2.5.13 Export Price of Waste Paper in Japan

(Unit: CIF, US\$/ton)

Month	Cardboard	Month	Cardboard	News Paper	Magazine	Month	Cardboard	News-paper	Magazine
01/1	90	03/1	117	-	-	05/1	124	143	118.5
2	95	2	127	-	-	2	130	149	120
3	90	3	134	-	-	3	132	151	120
4	70	4	133	-	-	4	132	150	120
5	65	5	105	-	-	5	128	145	119
6	60	6	115	-	-	6	123	134	110
7	65	7	118	-	-	7	123	135	115
8	65	8	123	-	-	8	127	140	118
9	65	9	128	-	-	9	131	140	118
10	70	10	125	-	-	10	128	143.5	122.5
11	72	11	129	-	-	11	127	145	124
12	62	12	125	-	-	12	120	135	120
02/1	65	04/1	130	-	-	06/1	118	137	121
2	65	2	138	-	-	2	124	137	124
3	67	3	135	-	-	3	126	139	125
4	72	4	133	-	-	4	125	136	125
5	85	5	125	-	-	5	125	134	118
6	120	6	119	119	110	6	128	136	116
7	125	7	119	119	110	7	132	138	116
8	110	8	118	125	109	8	136	144	119
9	116	9	127.5	123	110	9	136	144	123
10	105	10	125	131	113	10	135	148	126
11	116	11	120	131	120	11			
12	105	12	123	143	118.5	12			

Source: Kosi Journal

2.6 Material Flow of Recyclable Materials at Micro Scale

2.6.1 Waste Generation and Compositions

(1) Households (By High-Income Level)

A total number of 255 samples from high-income households were surveyed. 65 samples were surveyed in both Metro Cebu and Davao, while remaining 125 samples were done in Metro Manila.

It was found that the waste generation rate at high-income households in Metro Manila was recorded higher at about 0.58 kg/capita/day, followed by Davao and Cebu where the generation rates were almost same at 0.47 kg/capita/day. The weighted average for the waste generation rate for high-income households was calculated to be about 0.53 kg/capita/day.

In addition, the composition of waste generated was also analyzed from the surveys. The results are tabulated in Table 2.6.1 below together with the waste generation rates at each respective area.

Table 2.6.1 Waste Generation and Composition at High-Income Households

Waste Categories		Manila	Cebu	Davao	Average		%
		(kg/capita/day)				%	
Paper	Old Newspapers	0.067	0.084	0.034	0.063	12.0	22.2
	Old Corrugated Cartons	0.040	0.039	0.020	0.035	6.6	
	White Papers	0.009	0.008	0.009	0.008	1.6	
	Mixed Papers	0.011	0.011	0.009	0.011	2.0	
Metal	Steel Cans	0.014	0.010	0.018	0.006	1.1	3.7
	Aluminum Cans	0.004	0.004	0.010	0.014	2.7	
Plastic	PET Bottles	0.008	0.011	0.007	0.009	1.6	4.3
	Other plastic containers	0.005	0.003	0.006	0.005	0.9	
	Other plastics	0.009	0.008	0.011	0.009	1.8	
Glass	Glass Bottles	0.034	0.025	0.042	0.034	6.5	13.0
	Other Glass	0.018	0.071	0.031	0.035	6.6	
Others	Kitchen Wastes	0.212	0.111	0.131	0.165	31.5	31.5
	Garden Wastes	0.065	0.080	0.097	0.077	14.7	14.7
	Others	0.086	0.006	0.046	0.055	10.5	10.5
Total Waste Generation Rate (kg/cap/day)		0.581	0.471	0.472	0.525	-	-

As shown in Table 2.6.1, kitchen waste was recorded the highest at 31.5%, followed by paper (22.2%), garden waste (14.7%), glass (13.0%) and the others. The composition of kitchen waste was recorded lower than normally reported in other studies' findings while composition of papers, garden waste and glass were recorded to be higher. Based on this composition, about 45% of the waste generated was recyclable materials. The waste composition of high-income households is further illustrated in Figure 2.6.1 below:

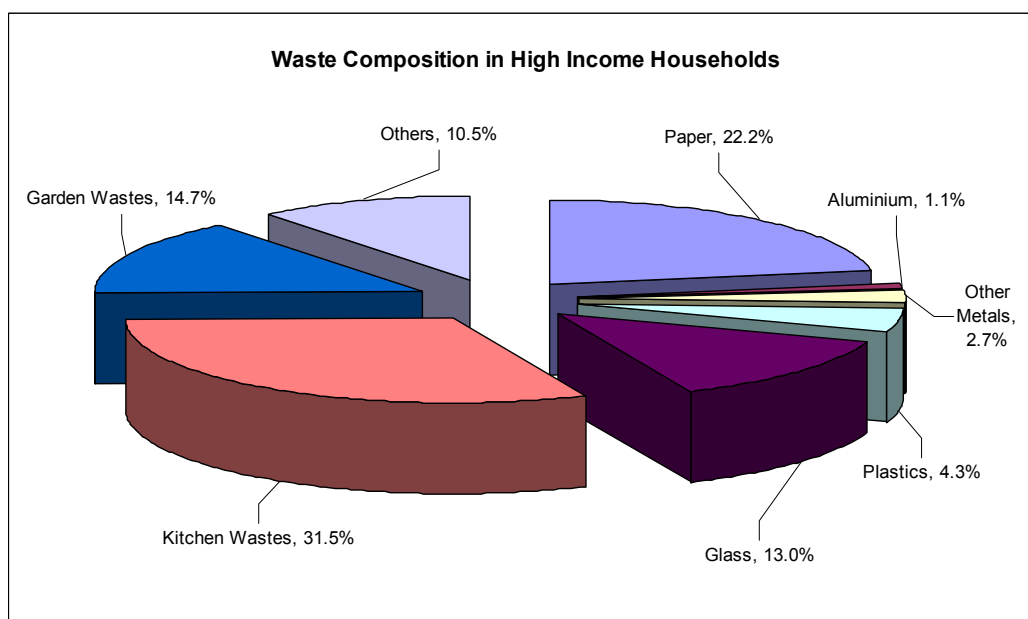


Figure 2.6.1 Waste Composition at High-Income Households

(2) Households (By Middle-Income Level)

A total number of 290 samples from middle-income households were surveyed. 70 samples were taken in both Metro Cebu and Davao, while the remaining 150 samples were done in Metro Manila.

It was found that the waste generation rate in Metro Manila was recorded to be about 0.46 kg/capita/day, followed by about 0.42 kg/capita/day in Davao and about 0.34 kg/capita/day in Cebu. The weighted average for the waste generation rate for middle-income households was calculated to be about 0.42 kg/capita/day as shown in Table 2.6.2.

Table 2.6.2 Waste Generation and Composition at Middle-Income Households

Waste Categories		Manila	Cebu	Davao	Average		%
		(kg/Capita/day)				%	
Paper	Old Newspapers	0.054	0.040	0.023	0.043	10.3	21.6
	Old Corrugated Cartons	0.024	0.018	0.019	0.021	5.1	
	White Papers	0.005	0.004	0.002	0.004	1.0	
	Mixed Papers	0.031	0.006	0.020	0.022	5.2	
Metal	Steel Cans	0.012	0.011	0.018	0.003	0.8	3.8
	Aluminum Cans	0.004	0.003	0.001	0.013	3.1	
Plastic	PET Bottles	0.012	0.011	0.005	0.010	2.4	5.8
	Other plastic containers	0.004	0.004	0.011	0.006	1.3	
	Other plastics	0.008	0.008	0.010	0.008	2.0	
Glass	Glass Bottles	0.034	0.020	0.029	0.029	7.0	11.0
	Other Glass	0.016	0.015	0.020	0.017	4.0	
Others	Kitchen Wastes	0.163	0.107	0.119	0.139	33.1	33.1
	Garden Wastes	0.071	0.044	0.105	0.073	17.4	17.4
	Others	0.021	0.049	0.035	0.031	7.4	7.4
Total Waste Generation Rate (kg/cap/day)		0.458	0.342	0.416	0.420	-	-

As shown in Table 2.6.2, the waste composition data for middle-income households was summarized based on the waste generation data obtained. It was found that the waste composition for middle-income households has recorded similar trend with high-income households where the highest composition was kitchen waste (33.1%), followed by papers (21.6%), garden waste (17.4%), glass (11%) and the others. The waste composition results show that also about 45% of the total waste generated was papers, plastics, metals and glass which are recyclable.

The waste composition of middle-income households is further illustrated in Figure 2.6.2 below:

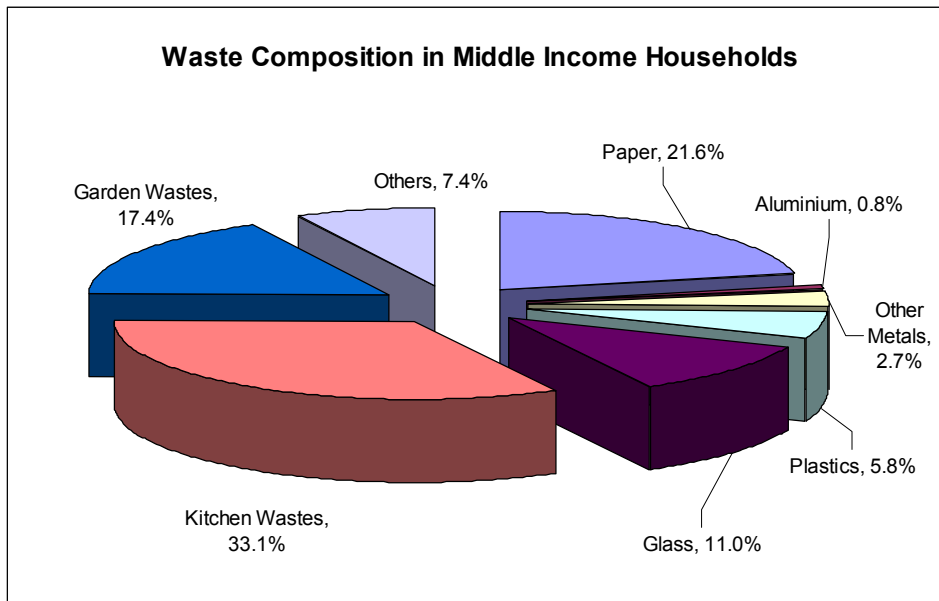


Figure 2.6.2 Waste Composition at Middle Income Households

(3) Households (By Low-Income Level)

A total number of 255 samples from low-income households were also surveyed. Similar to high-income household survey, a total of 65 samples were surveyed in both Metro Cebu and Davao, while the remaining 125 samples were done in Metro Manila.

It was found that the waste generation rate at low-income households in Metro Cebu was recorded the highest at about 0.68 kg/capita/day, followed by Davao at 0.46 kg/capita/day and Manila at 0.43 kg/capita/day. The weighted average for the waste generation rate for low-income households was calculated to be about 0.50 kg/capita/day.

On the other hand, the composition of waste generated was also analyzed from the surveys. The results are tabulated in Table 2.6.3 below together with the waste generation rates at each respective area.

Table 2.6.3 Waste Generation and Composition at Low-Income Households

Waste Categories		Manila	Cebu	Davao	Average		%
		(kg/Capita/day)				%	
Paper	Old Newspapers	0.045	0.097	0.040	0.057	11.4	22.9
	Old Corrugated Cartons	0.026	0.055	0.017	0.031	6.2	
	White Papers	0.016	0.011	0.006	0.012	2.4	
	Mixed Papers	0.010	0.020	0.018	0.015	2.9	
Metal	Steel Cans	0.009	0.021	0.013	0.007	1.4	4.1
	Aluminum Cans	0.005	0.015	0.003	0.013	2.6	
Plastic	PET Bottles	0.009	0.027	0.009	0.014	2.8	7.2
	Other plastic containers	0.004	0.025	0.006	0.010	2.0	
	Other plastics	0.009	0.020	0.012	0.012	2.5	
Glass	Glass Bottles	0.033	0.090	0.044	0.050	10.1	15.7
	Other Glass	0.020	0.047	0.024	0.028	5.6	
Others	Kitchen Wastes	0.105	0.155	0.145	0.128	25.6	25.6
	Garden Wastes	0.073	0.085	0.079	0.078	15.5	15.5
	Others	0.065	0.007	0.045	0.045	9.0	9.0
Total Waste Generation Rate (kg/cap/day)		0.429	0.677	0.461	0.500	-	-

Similar with the other high- and middle-income groups, the low-income households show highest composition for kitchen waste at 25.6%, followed by papers (22.9%), glass (15.7%), garden waste (15.5%) and the others. The waste composition results show that also about 49% of the total waste generated was papers, plastics, metals and glass which are recyclable materials.

The waste composition of low-income households is further illustrated in Figure 2.6.3 below:

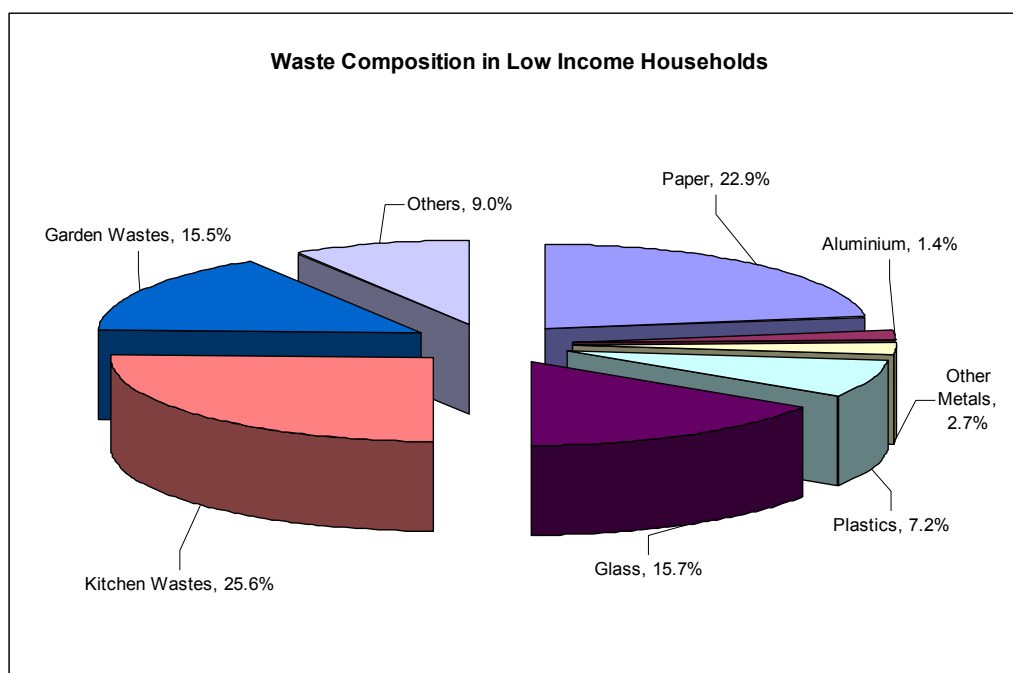


Figure 2.6.3 Waste Composition at Low Income Households

(4) Average Waste Composition at Households

Based on the findings for all the households surveyed at low, middle- and high-income areas, the weighted average was calculated based on the total number of samples collected at each income group. The average waste generation rate at Cebu was found to be higher at about 0.53 kg/capita/day, followed by Manila at about 0.45 kg/capita/day and Davao at 0.44 kg/capita/day. These waste generation rates give an average figure of about 0.47 kg/capita/day in the study areas as overall.

From the total waste generated, kitchen waste was recorded as highest in terms of composition at about 28.5%, followed by papers (22.3%), garden waste (16.2%), glass (13.8%) and the others. In general, about 46.6% of the waste were recyclable materials constitute of papers, plastics, glass and metals.

The overall weighted average figures for waste generation and compositions obtained in the surveys were summarized in Table 2.6.4 and Figure 2.6.4 below.

Table 2.6.4 The Overall Weighted Average for Waste Generation & Composition

Waste Categories		Manila	Cebu	Davao	Average		%
		(kg/Capita/day)				%	
Paper	Old Newspapers	0.049	0.074	0.033	0.051	11.0	22.3
	Old Corrugated Cartons	0.026	0.040	0.018	0.027	5.8	
	White Papers	0.011	0.008	0.005	0.009	1.9	
	Mixed Papers	0.018	0.014	0.018	0.017	3.7	
Metal	Steel Cans	0.005	0.010	0.003	0.005	1.2	4.0
	Aluminum Cans	0.010	0.017	0.015	0.013	2.8	
Plastic	PET Bottles	0.010	0.020	0.007	0.012	2.6	6.5
	Other plastic containers	0.004	0.016	0.008	0.008	1.7	
	Other plastics	0.008	0.015	0.011	0.011	2.3	
Glass	Glass Bottles	0.033	0.059	0.038	0.041	8.7	13.8
	Other Glass	0.019	0.035	0.023	0.024	5.1	
Others	Kitchen Wastes	0.133	0.134	0.134	0.134	28.5	28.5
	Garden Wastes	0.072	0.069	0.090	0.076	16.2	16.2
	Others	0.048	0.024	0.041	0.040	8.6	8.6
Total Waste Generation Rate (kg/cap/day)		0.448	0.533	0.443	0.468	-	-

As shown in Table 2.6.4, the waste composition was found to be different as compared to other results reported in other literatures or studies done in the Philippines. This is due to the reason that the survey was done through interview and not an actual waste composition study by manual sorting. Therefore the feedbacks given by the respondents were only rough estimations as compared to actual waste composition study. However, the findings from the surveys provide useful information on the types and amount of waste generated, how much recyclable materials is available and what is the current practice of waste disposal which is crucial for the identification of material flow as a whole.

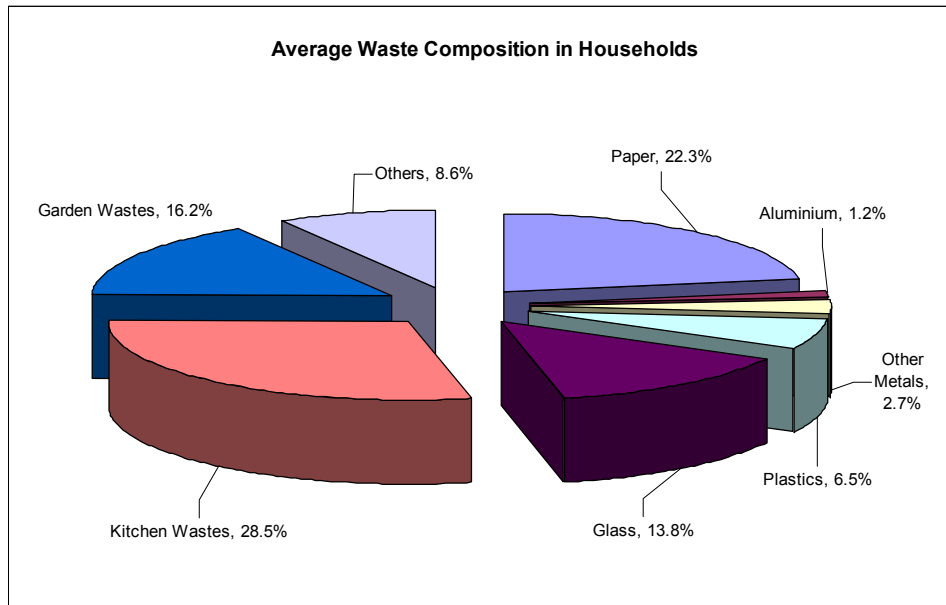


Figure 2.6.4 The Average Weighted Waste Composition from the Surveys

For reference purpose, some results on waste generation and waste composition from other studies carried out in various parts of the Philippines are summarized in Table 2.6.5 as follows:

2.6.2 Business Entities

There are four (4) classifications made under the surveys on business entities, namely product based businesses, service based businesses, offices and institutions. A total of 400 sample respondents were surveyed under these categories at the same study areas in Metro Manila, Cebu and Davao.

It should be noted that the survey areas are all key cities and are hubs for wide range of commercial establishments and institutions including schools (universities and state colleges) and government offices. Based on the surveys done where a wide range of business entity types were obtained, the samples were then further classified into 6 categories, namely (1) Institutions; (2) supermarkets; (3) restaurants; (4) offices; (5) hospitals and (6) other shops.

The respondents who were interviewed varied from caretakers, cashiers, utility men, managers and even the president or the owner of the companies.

(1) Business Entities (By Institutions)

The institutions surveyed in Metro Manila, Cebu and Davao cover a wide range of establishments, including government institutions, elementary and high schools, colleges, universities, training centers, research institutes, religious seminary, parish and some others. A total of 64 samples of institutions were collected and analyzed.

The survey findings show that the biggest composition of waste being generated from the institutions is papers (about 42.4%), followed by kitchen waste (15.3%), plastics (14.2%), garden waste (10.7%), metals (7.3%), glass (5.8%) and the others (4.4%). This indicates that nearly 70% of the wastes generated from institutions were recyclable materials, where white papers were among the highest at 13.6%, followed by mixed papers at 10.8%, old newspapers at 9.5%, carton boxes at 8.4%, PET bottles at 7.8% and other plastics at about 6.4%.

The composition of wastes generated from institutions surveyed was summarized in Table 2.6.5 and Figure 2.6.5.

Table 2.6.5 Waste Composition at Institutions

Waste Categories (Institutions)		Average (%)	
Paper	Old Newspapers	9.52	42.35
	Old Corrugated Cartons	8.42	
	White Papers	13.57	
	Mixed Papers	10.83	
Metal	Steel Cans	1.52	7.29
	Aluminum Cans	5.77	
Plastic	PET Bottles	7.78	14.18
	Other plastic containers	3.55	
	Other plastics	2.85	
Glass	Glass Bottles	4.26	5.81
	Other Glass	1.55	
Others	Kitchen Wastes	15.28	15.28
	Garden Wastes	10.65	10.65
	Others	4.44	4.44
TOTAL		100.00	100.00

Remarks: Total institutions surveyed was 64

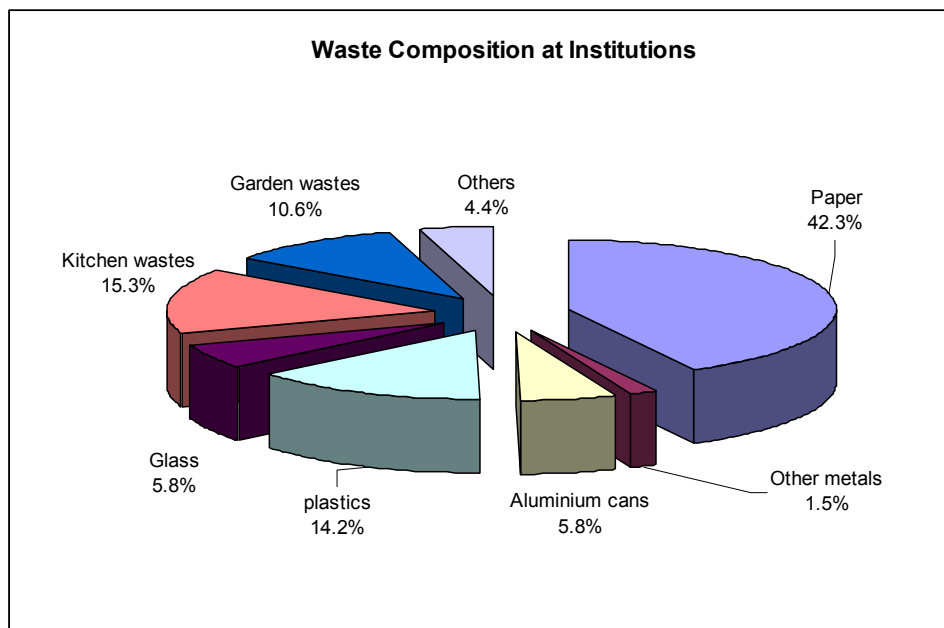


Figure 2.6.5 The Weighted Average for Waste Composition at Institutions

(2) Business Entities (By Offices)

A total of 131 offices were surveyed covering a wide range of office types, including the lawyer companies, insurance companies, accounting firms, consultancy firms, sales and marketing companies, advertising companies, telecommunication firms, courier offices and the others. The results of the surveys were summarized in Table 2.6.6 below:

Table 2.6.6 Waste Composition at Offices

Waste Categories (Offices)		Average (%)	
Paper	Old Newspapers	9.70	44.03
	Old Corrugated Cartons	17.23	
	White Papers	10.68	
	Mixed Papers	6.41	
Metal	Steel Cans	1.60	2.90
	Aluminum Cans	1.30	
Plastic	PET Bottles	3.29	7.03
	Other plastic containers	0.76	
	Other plastics	2.98	
Glass	Glass Bottles	3.99	5.33
	Other Glass	1.34	
Others	Kitchen Wastes	19.38	19.38
	Garden Wastes	18.88	18.88
	Others	2.44	2.44
TOTAL		100.00	100.00

Remarks: Total offices surveyed was 131

It was shown that the highest waste composition generated from offices was found to be also papers at about 44.0%, followed by kitchen waste (19.4%), garden waste (18.9%), plastics (7.0%), metals (2.9%) and others. Based on these figures, about 60% of the wastes from offices are recyclable materials, where among the highest was carton boxes (17.2%), white papers (10.7%), old newspapers (9.7%) and other mixed papers (6.4%).

The waste composition from offices surveyed was further illustrated in Figure 2.6.6 below.

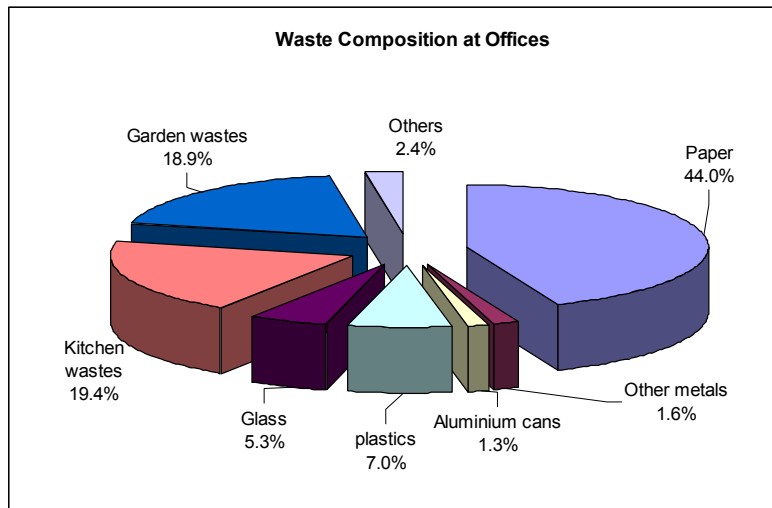


Figure 2.6.6 The Weighted Average for Waste Composition at Offices

(3) Business Entities (By Restaurants)

Only 26 restaurants were surveyed in the study, in which 13 were from Manila, 5 from Cebu and 8 from Davao. The results of the surveys were summarized in Table 2.6.7 below. As expected, kitchen or food waste is the biggest composition of waste generated from the restaurants, contributed to about 66.0% of the total wastes generated. This is followed by garden waste (about 16.2%), glass bottles (about 6.4%), plastics (about 5.6%), papers (4.1%) and the others.

The figures show that in comparison with waste generated from other sources such as offices and institutions, the recyclable wastes from restaurants were relatively low at only about 17%, since the majority of the waste generated were food waste and garden wastes. The compositions of waste generated from restaurants are further illustrated in Table 2.6.7 below.

Table 2.6.7 Waste Composition at Restaurants

Waste Categories (Restaurants)		Average (%)	
Paper	Old Newspapers	0.74	4.07
	Old Corrugated Cartons	2.40	
	White Papers	0.30	
	Mixed Papers	0.63	
Metal	Steel Cans	0.54	1.03
	Aluminum Cans	0.49	
Plastic	PET Bottles	1.55	5.62
	Other plastic containers	3.23	
	Other plastics	0.85	
Glass	Glass Bottles	6.16	6.38
	Other Glass	0.22	
Others	Kitchen Wastes	66.05	66.05
	Garden Wastes	16.16	16.16
	Others	0.68	0.68
TOTAL		100.00	100.00

Remarks: Total restaurants surveyed was 26

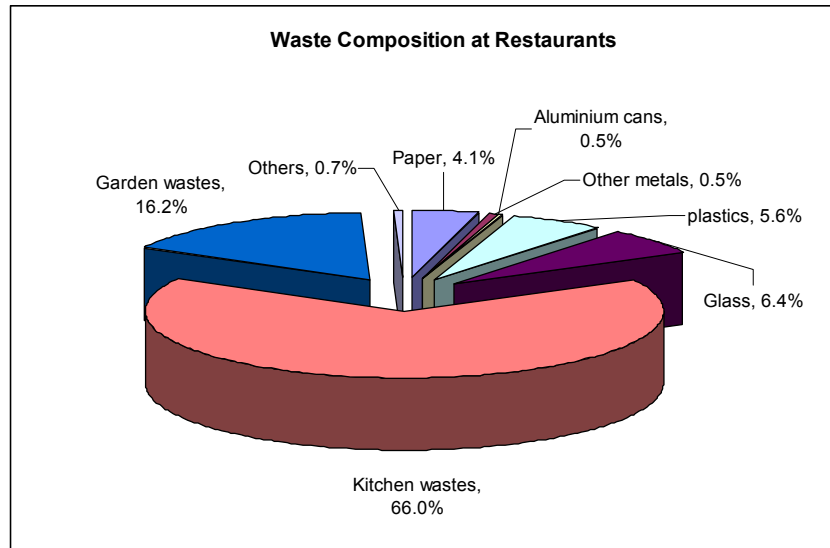


Figure 2.6.7 The Weighted Average for Waste Composition at Restaurants

(4) Business Entities (By Supermarkets)

Supermarkets were also selected in the survey, where a total of 14 samples from supermarkets were done. The business entities categorized under the category of supermarkets include general merchandise, retailers, wholesalers and convenient shops. The results from the surveys were summarized in Table 2.6.8 as follows:

Table 2.6.8 Waste Composition at Supermarkets

Waste Categories (Supermarkets)		Average (%)	
Paper	Old Newspapers	0.20	98.07
	Old Corrugated Cartons	97.66	
	White Papers	0.17	
	Mixed Papers	0.04	
Metal	Steel Cans	0.06	0.13
	Aluminum Cans	0.07	
Plastic	PET Bottles	0.25	0.48
	Other plastic containers	0.06	
	Other plastics	0.17	
Glass	Glass Bottles	0.04	0.36
	Other Glass	0.31	
Others	Kitchen Wastes	0.91	0.91
	Garden Wastes	0.00	0.00
	Others	0.05	0.05
TOTAL		100.00	100.00

Remarks: Total supermarkets surveyed was 14

As indicated in the figures shown in Table 2.6.8, the supermarkets generated mostly corrugated cardboards from their premises (about 98%), mainly from the packaging materials of the products. The other categories of wastes generated from the supermarkets were found not significant.

In other words, this shows that recyclable materials available from the supermarkets were the highest among the other business entities, since the corrugated cardboards are 100% recyclable materials.

The compositions of waste generated from supermarkets are further illustrated in Figure 2.6.8 below.

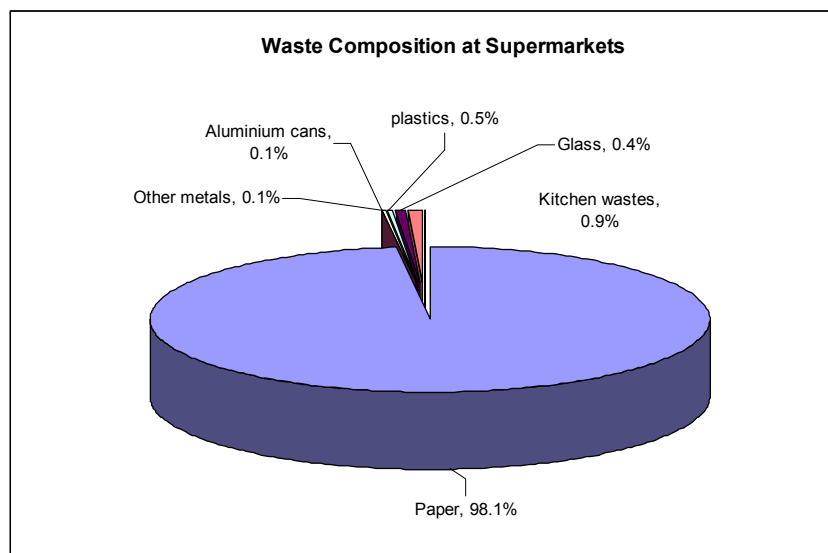


Figure 2.6.8 The Weighted Average for Waste Composition at Supermarkets

(5) Business Entities (By Hospitals)

Surveys to 13 hospitals were carried out including some clinics, focusing only on municipal solid wastes except medical wastes. It was found that hospitals generate about 36.6% of paper as the highest percentage of composition, followed by glass (about 16.7%), kitchen waste (about 14.5%), plastics (about 10%), garden waste (about 4.7%), metals (about 2.1%) and the others. Out of these figures, corrugated cartons were recorded relatively high at 17.5% from the packaging materials.

The findings on the waste composition show that the recyclable materials available in the waste stream from hospitals were also high at approximately 65%. The summary of the findings for waste composition from hospitals is shown in Table 2.6.9 and Figure 2.6.9 below.

Table 2.6.9 Waste Composition at Hospitals

Waste Categories (Hospitals)		Average (%)	
Paper	Old Newspapers	15.33	36.55
	Old Corrugated Cartons	17.47	
	White Papers	2.23	
	Mixed Papers	1.51	
Metal	Steel Cans	0.63	2.10
	Aluminum Cans	1.47	
Plastic	PET Bottles	3.84	9.92
	Other plastic containers	2.93	
	Other plastics	3.15	

Waste Categories (Hospitals)		Average (%)	
Glass	Glass Bottles	3.09	16.67
	Other Glass	13.58	
Others	Kitchen Wastes	14.51	14.51
	Garden Wastes	4.69	4.69
	Others	15.56	15.56
TOTAL		100.00	100.00

Remarks: Total hospitals surveyed was 13

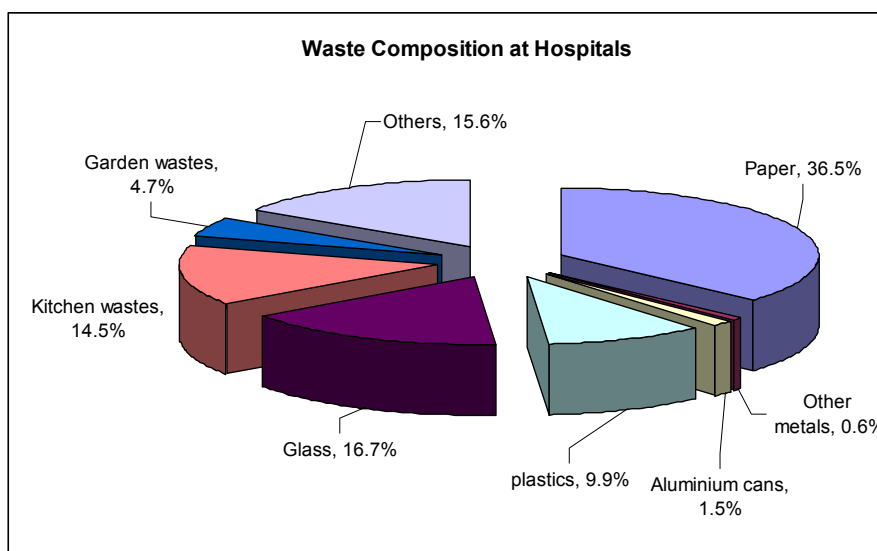


Figure 2.6.9 The Weighted Average for Waste Composition at Hospitals

(6) Business Entities (By Other Shops)

A wide range of other shops were surveyed including petrol stations, bakery, shoe repair shop, pharmacy, stationery shop, beauty saloon, barber shop, hardware shop, internet café and many others. A total of 139 other shops were surveyed in Manila, Cebu and Davao.

It should be emphasized that the waste composition from different shops may differ greatly based on the nature of the business. However, the average composition of waste generated from all the other shops surveyed were summarized and shown in Table 2.6.6 below.

Table 2.6.10 Waste Composition at Other Shops

Waste Categories (Other Shops)		Average (%)	
Paper	Old Newspapers	7.72	51.46
	Old Corrugated Cartons	24.16	
	White Papers	18.03	
	Mixed Papers	1.54	
Metal	Steel Cans	2.95	6.27
	Aluminum Cans	3.32	
Plastic	PET Bottles	4.88	10.11
	Other plastic containers	0.92	
	Other plastics	4.32	

Waste Categories (Other Shops)		Average (%)	
Glass	Glass Bottles	5.12	8.87
	Other Glass	3.76	
Others	Kitchen Wastes	16.42	16.42
	Garden Wastes	0.43	0.43
	Others	6.43	6.43
TOTAL		100.00	100.00

Remarks: Total other shops surveyed was 139

It is clearly shown that papers were the highest composition of waste generated from the shops (about 51.5%), particularly the corrugated cartons which contributed to about 24.2%. White papers also recorded significant amount of about 18% from the total waste stream. In addition to that, kitchen wastes recorded as the second highest at about 16.4%, followed by plastics (about 10.1%), glass (about 8.9%), metals (about 6.3%) and the others.

In general, the findings show that the recyclable materials available in the waste stream of other shops surveyed was relatively high at approximately 67%, including papers, plastics, glass and metals.

The average waste composition from the other shops surveyed is further illustrated in Figure 2.6.10 as follows:

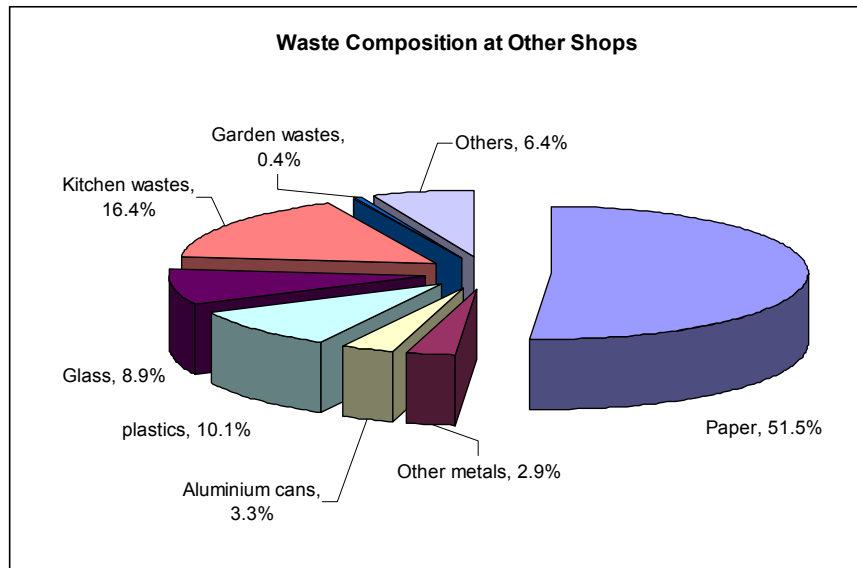


Figure 2.6.10 The Weighted Average for Waste Composition at Other Shops

2.6.3 Waste Disposal Methods at Households

(1) Households

Information on the disposal methods for all categories of wastes generated were obtained from the

interview surveys. The disposal methods are (A) waste bin with no separation; (B) separated and placed into bags or bins for municipal waste collection; (C) sell or give to door-to-door collectors; (D) bring to recycling centers; (E) bury in the yard; (F) feed to animals; (G) reuse; (H) burn; (I) compost; (J) throw in rivers or creeks; and (K) others. The disposal methods are further grouped into 4 groups, i.e.:

- 1) Discarded into waste bin for collection to landfill (A and B)
- 2) Sell or give to door-to-door collectors (C)
- 3) Bring to recycling centers (D)
- 4) Other disposal methods (E, F, G, H, I, J and K)

1) Disposal Methods at Households: Metro Manila

It was found that big portions of the recyclable materials are being discarded into waste bins for normal waste collection in Metro Manila, where the wastes are collected and disposed of to the landfills. Other metals recorded the highest in terms of disposal to waste bin (about 74.9%), followed by Aluminum cans (about 64.7%), glass (about 58.9%), plastics (about 56.0%) and papers (about 47.3%).

About 20% to 30% of the recyclable materials were being recycled by the households mostly by selling to door-to-door collectors, as well as bring to recycling centers. Papers were found to be recycled the most at a rate of about 33.6%, followed by aluminum cans (about 31.5%), glass (about 28.7%), plastics (about 24.0%) and other metals (about 20.6%).

The disposal methods in households of Metro Manila found in the surveys were summarized in Figure 2.6.11 below:

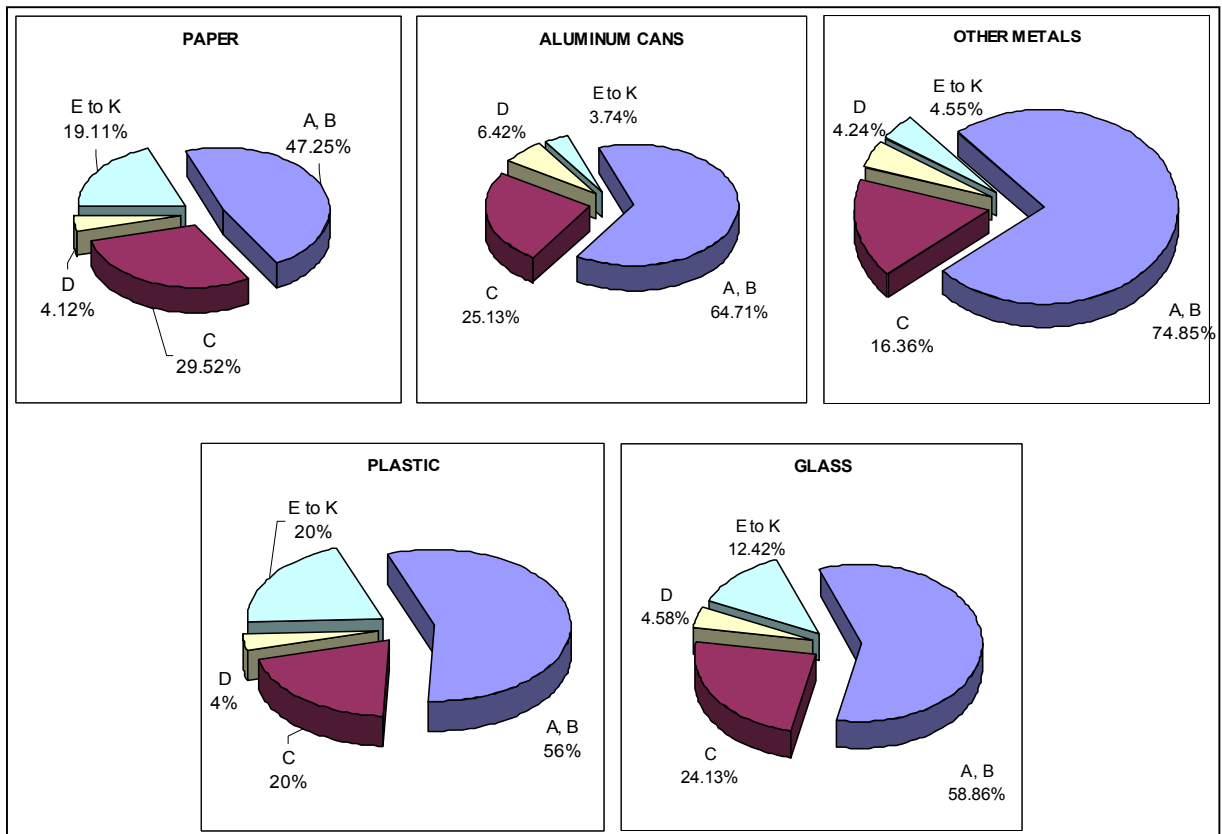


Figure 2.6.11 The Disposal Methods at Households in Metro Manila

2) Disposal Methods at Households: Metro Cebu

In Metro Cebu, the disposal methods of recyclable materials from households were found to be different from Metro Manila. Recycling through selling to door-to-door collectors or recycling centers were found higher at a range of about 30% to more than 70%. The highest being recycled is aluminum cans at about 71.6%, followed by glass (about 52%), other metals (about 48.3%), plastics (about 39%) and papers (about 29%). Big portions of papers were found to be disposed through other methods (about 45.7%), which mainly being reused and burnt.

The disposal methods in households of Metro Cebu found in the surveys were summarized in Figure 2.6.12 below:

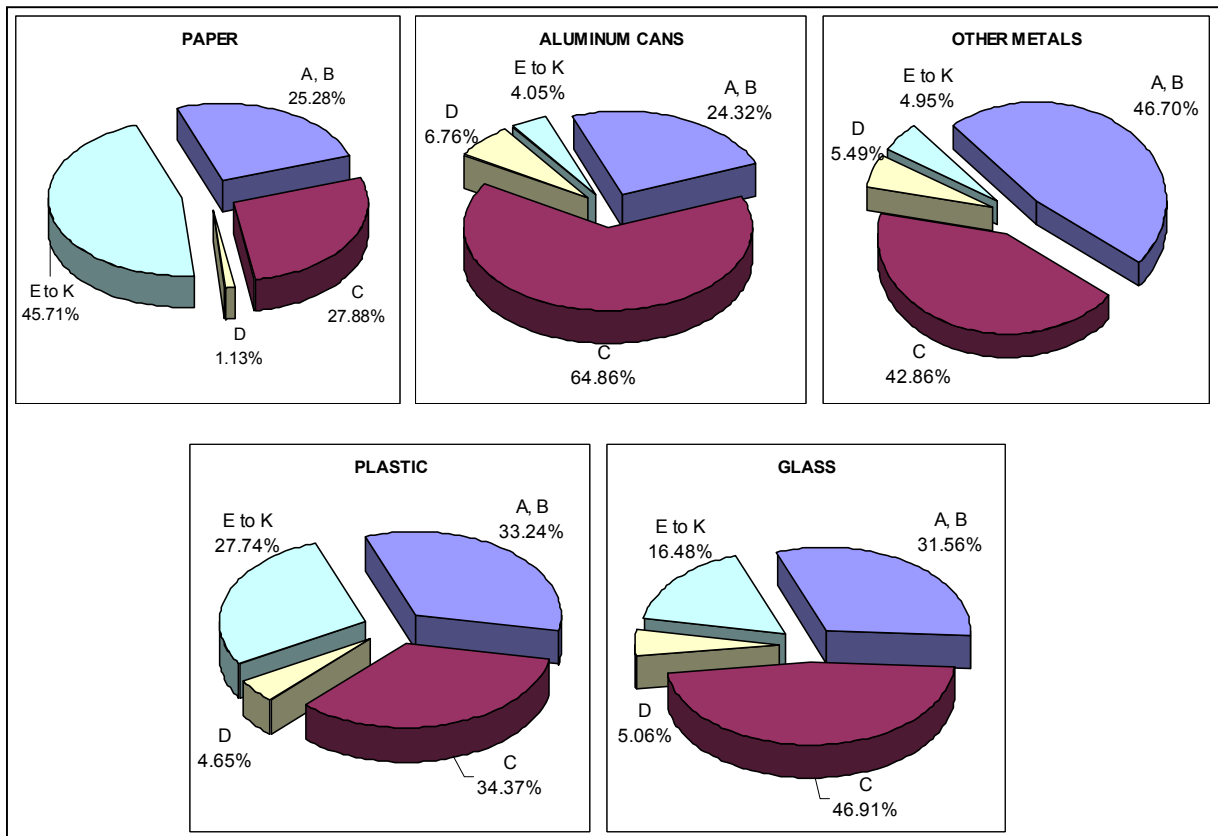


Figure 2.6.12 The Disposal Methods at Households in Metro Cebu

3) Disposal Methods at Households: Metro Davao

In Metro Davao, most of recyclable materials have recorded disposal methods via recycling from a range of 30% to 60% except for papers which recorded a rate of only about 20.7%. For glass and other metals in particular, the responses from the interviews showed that more than 50% of the glass, and other metals generated from the households were either sold to door-to-door collectors or bring to recycling centers. This is followed by plastics at about 42% and Aluminum cans at 36%.

The disposal methods in households of Metro Davao found in the surveys were summarized in Figure 2.6.13 below:

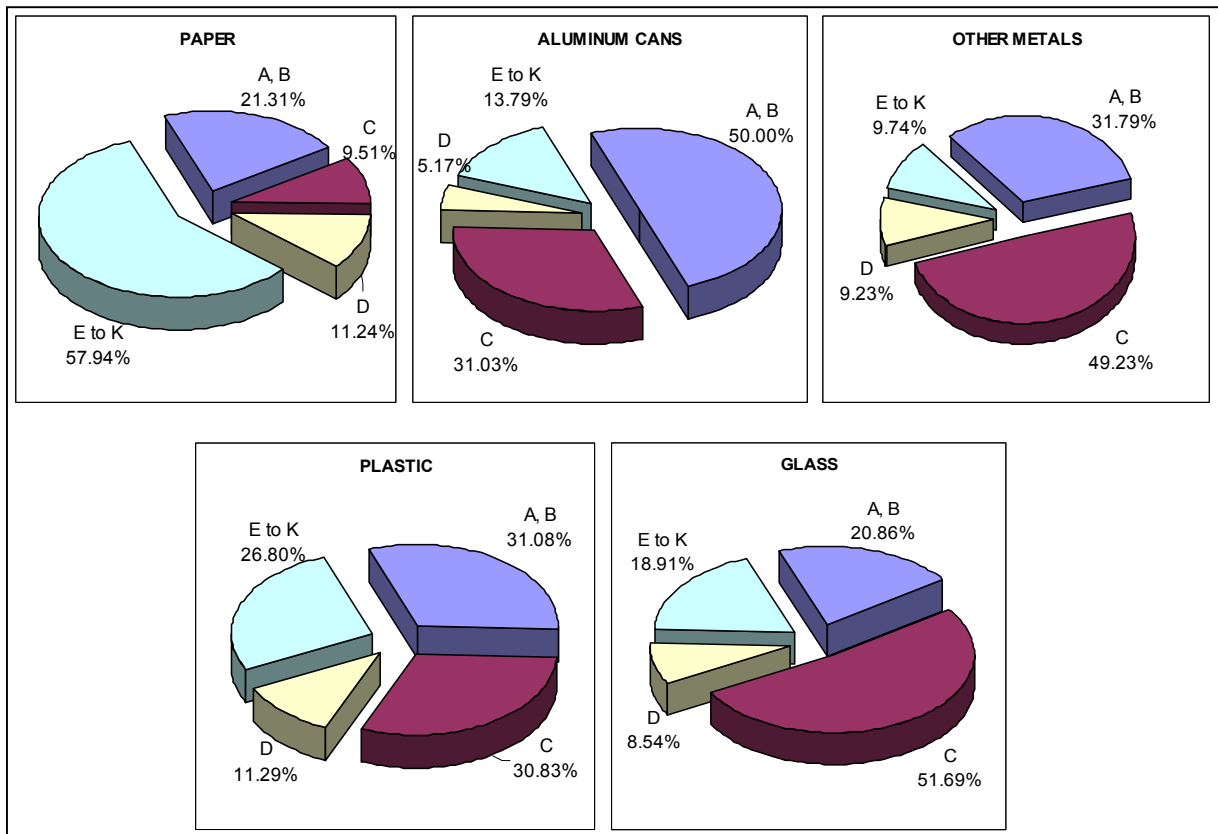


Figure 2.6.13 The Disposal Methods at Households in Metro Davao

(2) Business Entities

The disposal methods of recyclable materials from business entities at Metro Manila, Cebu and Davao were also obtained from the surveys. By following the similar disposal methods grouping used for households, the results from the surveys were described as follows:

1) Disposal Methods at Business Entities: Metro Manila

The disposal methods by business entities are similar with households in Metro Manila, except that the recycling by business entities is relatively higher than the households, ranges from about 30% to 50%. Further details of the results are illustrated in Figure 2.6.14 below:

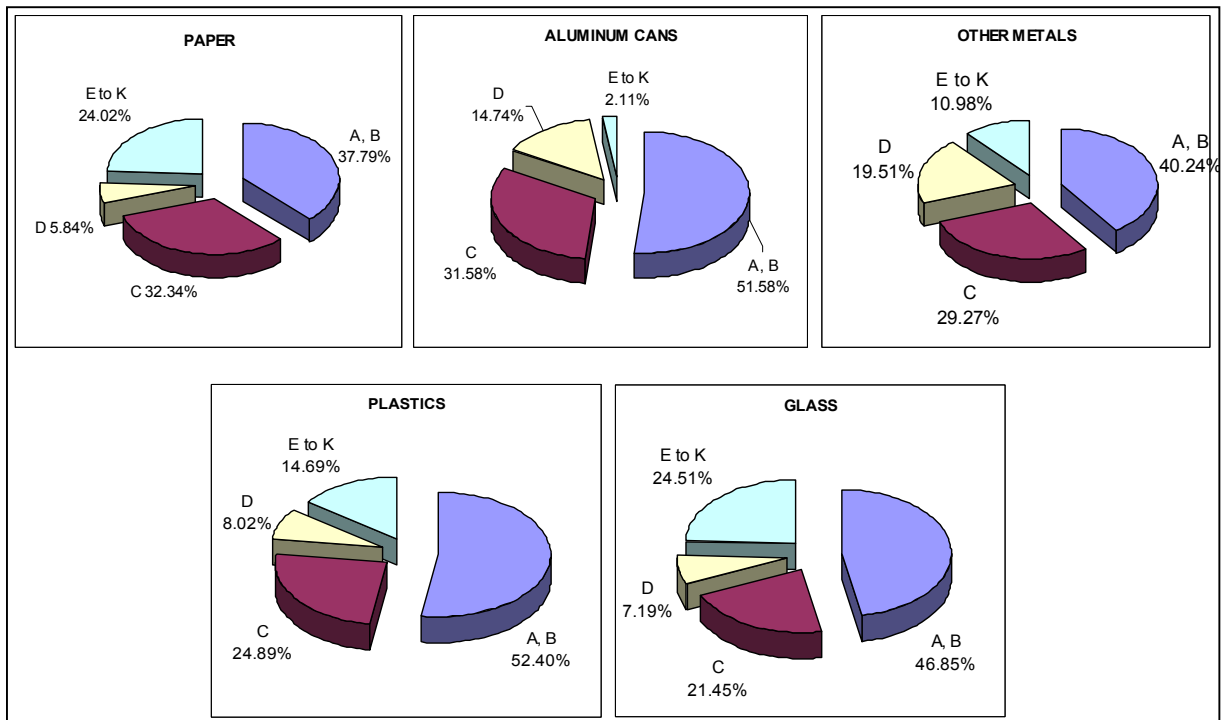


Figure 2.6.14 The Disposal Methods at Business Entities in Metro Manila

2) Disposal Methods at Business Entities: Metro Cebu

In Metro Cebu, recycling through selling to door-to-door collectors or recycling centers were high at a range of about 35% to 50%. Plastics, glass, aluminum cans and other metals were found to have similar disposal methods by the business entities, where about 30% to 50% was disposed to waste bins, while the other about 35% to 50% was disposed to either by selling to collectors or sold to recycling centers. Similar with the findings for households, big portions of papers in Cebu were found to be disposed of through other methods (about 44.4%), which mainly being reused and burnt.

The disposal methods at the business entities in Metro Cebu found in the surveys were summarized in Figure 2.6.15 below:

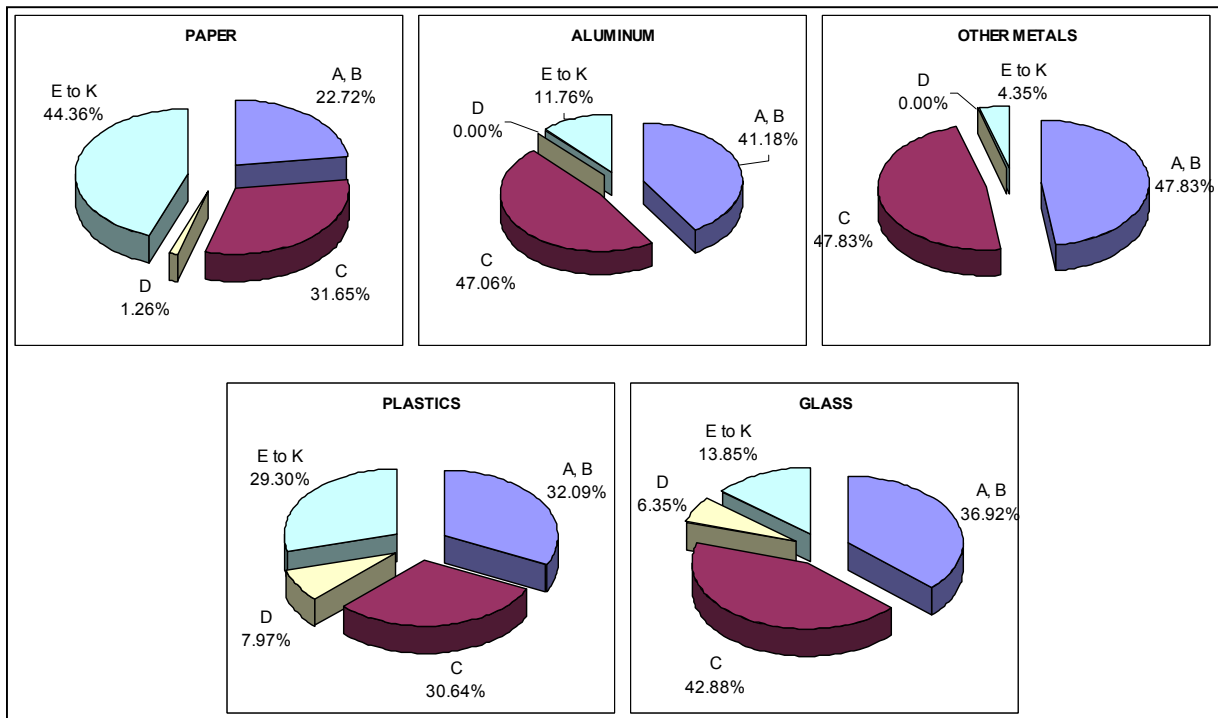


Figure 2.6.15 The Disposal Methods at Business Entities in Metro Cebu

3) Disposal Methods at Business Entities: Metro Davao

Similarly with the findings of households in Metro Davao, most of recyclable materials have recorded disposal methods via recycling from a range of 30% to 60% except for papers which recorded a rate of only about 21%. Material that shows the highest recycling by the business entities is aluminum cans (about 55.5%), followed by other metals (about 42.8%), plastics (about 32.9%) and glass (about 30.5%).

The disposal methods at business entities in Metro Davao found in the surveys were summarized in Figure 2.6.16 below:

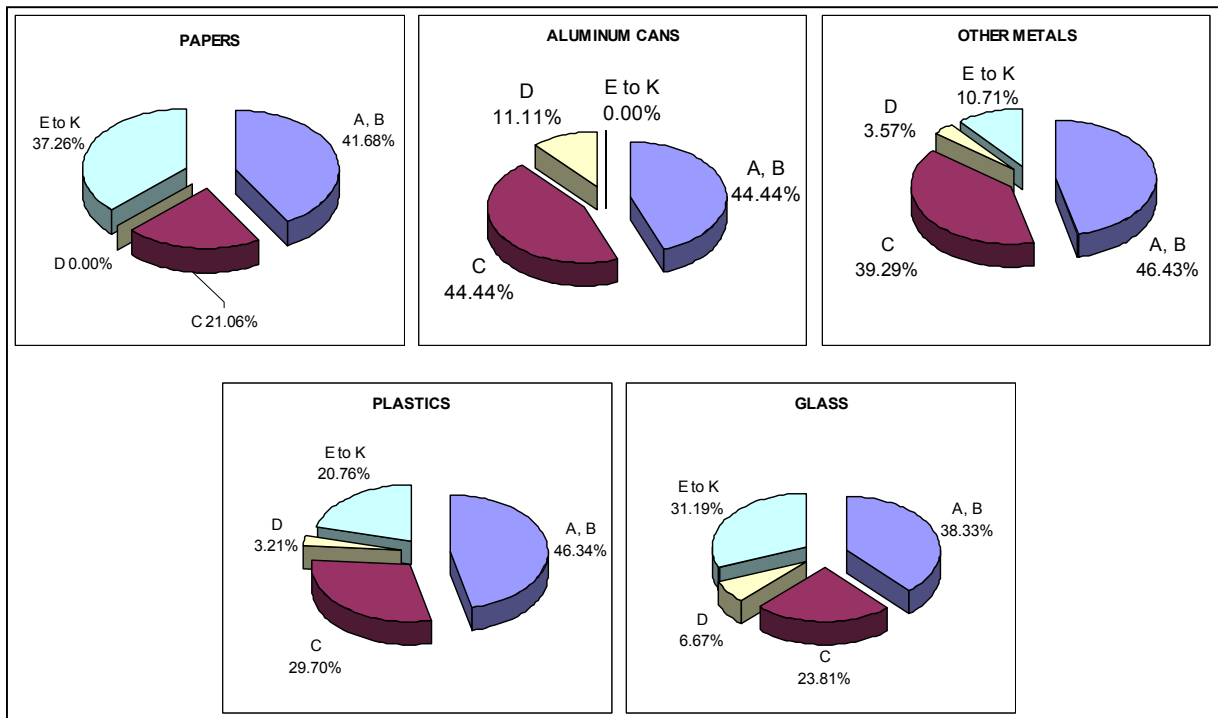


Figure 2.6.16 The Disposal Methods at Business Entities in Metro Davao

2.6.4 Material Flow at Micro Scale

The findings from the surveys were used to derive the flows of each recyclable material targeted in the study. As mentioned earlier that the recyclable materials are going through several players before they are finally ended at the recycling industries in the Philippines or exported to overseas, detailed surveys were done on each of these recycling players. The major findings are summarized in the following sections:

1) Primary Collectors

The primary collectors surveyed in the study areas include street pickers, waste truck workers and landfill scavengers. A total of 54 primary collectors were surveyed, and the results of the surveys were summarized in Table 2.6.11 below.

Table 2.6.11 Types and Quantity of Materials Collected by the Primary Collectors

Type of Recyclables		Quantity collected per collector					
		Kg/day				Tones/month	
		Manila	Cebu	Davao	Average		
Papers	Old Newspapers	3.31	1.33	1.52	2.40	0.072	0.65
	Old Corrugated Cardboard	12.99	3.56	5.26	8.79	0.264	
	White paper	4.54	1.10	1.43	2.95	0.089	
	Mixed paper	8.69	4.06	10.00	7.67	0.230	
Metals	Metal scrap (Aluminum cans)	1.63	0.26	0.76	1.07	0.032	0.38
	Metal scrap (Steel)	10.18	3.10	2.55	6.66	0.200	
	Metal Scrap (Others)	3.75	2.20	12.20	5.04	0.151	
Plastics	PET Bottles	3.46	1.32	2.76	2.72	0.082	0.38
	Other plastic containers	4.38	0.89	1.14	2.75	0.083	
	Other plastics	8.63	1.74	11.16	7.23	0.217	
Glass	Glass Bottles	3.93	0.41	9.33	4.05	0.122	0.30
	Other Glass	5.24	0.34	15.34	5.94	0.178	
	Others	6.85	1.78	6.19	5.31	0.159	0.16
Total		77.60	22.09	79.64	62.59	1.880	1.88

Remarks: Total primary collectors surveyed was 54

It was shown that primary collectors in Manila and Davao are generally collecting much more materials as compared to Cebu. The primary collectors in Davao collected the highest at a rate of about 79.6 kg/day, followed by collectors in Manila at about 77.6 kg/day and Cebu at only about 22.1 kg/day. In average, the primary collectors were found to collect about 62.6 kg/day or about 1.88 tones of recyclable materials per month.

In terms of the types of materials collected, it was found that papers are the materials that collected most by the primary collectors at the average rate of 650 kg/month for each primary collector. This is followed by metals and plastics at the same rate of about 380 kg/month, and glass at about 300 kg/month.

2) Eco-Aides

Eco-aide is a unique recycling player in the Philippines who are collectors that pay to buy back recyclable materials from the generation sources, unlike the other primary collectors who collect recyclable material for free. In the surveys, a total of 24 eco-aides were surveyed. The results of the surveys were summarized in Table 2.6.12.

Table 2.6.12 Types and Quantity of Materials Collected by the Eco-Aide

Type of Recyclables		Quantity collected per Eco-aide					
		Kg/day				Tones/month	
		Manila	Cebu	Davao	Average		
Papers	Old Newspapers	2.59	5.69	0.00	2.50	0.075	0.383
	Old Corrugated Cardboard	2.83	5.36	0.00	2.52	0.076	
	White paper	2.21	16.67	0.00	5.09	0.153	
	Mixed paper	0.36	10.00	0.00	2.65	0.079	
Metals	Metal scrap (Aluminum cans)	2.47	4.10	2.55	2.90	0.087	0.380
	Metal scrap (Steel)	1.27	1.05	0.25	0.88	0.026	
	Metal Scrap (Others)	5.26	15.79	8.25	8.89	0.267	
Plastics	PET Bottles	1.93	1.71	0.80	1.50	0.045	0.156
	Other plastic containers	2.43	1.98	1.75	2.09	0.063	
	Other plastics	0.00	6.43	0.00	1.61	0.048	
Glass	Glass Bottles	0.86	2.76	3.09	2.08	0.062	0.107
	Other Glass	0.00	5.93	0.00	1.48	0.044	
	Others	0.00	1.11	0.00	0.28	0.008	0.008
Total		22.20	78.56	16.70	34.46	1.030	1.030

Remarks: Total eco-aide surveyed was 24

It was found that the results were different from the primary collectors, where the Eco-aide in Cebu was collecting much more than in Manila and Davao, at a rate of about 78.6 kg/day, as compared to only about 22.2 kg/day in Manila and about 16.7 kg/day in Davao. These results explain that Eco-aide is more common in Cebu as compared to Manila and Davao where the primary collectors are still dominant. In average, the Eco-aide was found to collect about 34.5 kg/day or about 1.03 tones of recyclable materials per month.

In terms of the types of materials, papers and metals were found to be the biggest collected materials both at about 380 kg/month, followed by plastics at about 160 kg/month and glass at about 100 kg/month.

3) Junkshops, Traders and Middlemen

For recycling junkshops, traders and middlemen, surveys were carried out also in other 16 regions of the Philippines in addition to Metro Manila, Cebu and Davao. A total of 321 samples were surveyed, and the results are summarized in Table 2.6.13 as follows:

Table 2.6.13 Types and Quantity of Materials Collected by the Junkshops, Traders and Middlemen

Type of Recyclables		Quantity Collected Per Junkshop					Tones/month	
		Kg/day						
		Manila	Cebu	Davao	16-Reg.	Average		
Papers	Old Newspapers	35.44	9.35	27.57	62.90	39.03	1.17	6.07
	Old Corrugated Cardboard	89.63	130.72	125.98	150.56	121.44	3.64	
	White paper	31.35	33.05	9.29	6.00	19.76	0.59	
	Mixed paper	33.93	28.59	1.67	16.03	21.96	0.66	
Metals	Metal scrap (Aluminum)	69.55	53.55	51.13	1067.42	384.25	11.53	97.89
	Metal scrap (Steel)	23.09	6.84	10.24	194.85	73.61	2.21	
	Other Metal scrap	126.54	325.99	82.69	8404.86	2,805.27	84.16	
Plastics	PET bottles	33.08	59.36	29.15	47.96	41.12	1.23	4.86
	Other plastic containers	50.78	105.79	23.19	108.90	73.01	2.19	
	Other plastics	19.77	33.53	115.27	51.29	48.01	1.44	
Glass	Glass bottles	37.51	92.36	72.55	492.03	197.45	5.92	6.83
	Other Glass	16.50	68.43	25.60	30.44	30.27	0.91	
	Others	63.62	29.42	2.47	103.07	60.88	1.83	1.83
Total		630.80	976.98	576.79	10,736.32	3,916.06	117.48	117.48

Remarks: Total traders, middlemen and junkshops surveyed was 321

The junkshops, traders and middlemen who are accepting recyclable materials from the primary collectors and Eco-aides, are found to accept about 3.9 tones/day of recyclable materials or about 117.5 tones/month. Metro Cebu was found to record a collection rate of about 977.0 kg/day, followed by 630.8 kg/day in Manila and 576.8 kg/day in Davao. The amount collected in the other 16 regions of the Philippines was extremely high due to the reason that more scrap metals yards were surveyed in these regions. Therefore, the average amount of scrap metals collected per month was also recorded extremely high at about 97.9 tones/month, as compared to glass at only 6.8 tones/month, papers at 6.1 tones/month and plastics at 4.9 tones/month.

2.6.5 Prices of Recyclable Materials

Prices of the recyclable materials at different stages of recycling following the material flows, i.e. at the generation sources, primary collectors, junkshops, traders, middlemen as well as recycling industries were identified in the surveys. Wide ranges of prices were sometimes given by the respondents at different areas. The summaries of the major findings on price flow of the recyclable materials are described in the following section.

(1) Prices at Generation Sources

There are 2 main generation sources categorized in the surveys, namely the household and business entities:

1) Household Levels

Based on the survey results, it was shown that the households sold the recyclable materials at wide price ranges. The details of the maximum and minimum prices found, as well as the weighted average prices for the main 5 categories of recyclable materials targeted in this study is summarized in Table 2.6.14 below.

Table 2.6.14 Selling Prices of Recyclable Materials from Households (in Peso/kg)

Recyclable Materials	Metro Manila			Metro Cebu			Metro Davao			Average	
	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.		
Old Newspapers	29.00	0.40	6.32	8.00	1.00	3.61	10.00	2.00	5.11	5.33	5.72
Old Corrugated Cartons	50.00	1.00	10.19	7.00	1.00	3.10	4.00	1.00	2.32	6.26	
White Paper	15.00	1.00	9.96	2.00	0.15	1.50	2.00	2.00	2.00	5.92	
Mixed Paper	15.00	1.00	4.92	10.00	1.50	6.38	7.00	7.00	7.00	5.38	
Aluminum cans	80.00	5.00	34.32	80.00	7.50	36.06	65.00	10.00	31.50	34.44	34.44
Other metals	10.00	2.00	5.32	8.00	0.80	2.76	7.00	0.50	2.42	2.95	2.95
PET bottles	21.00	3.00	11.96	20.00	2.00	8.43	8.00	1.00	3.74	8.46	5.72
Other plastic containers	8.00	1.00	3.18	9.00	1.00	5.16	8.00	1.00	3.31	3.82	
Other plastics	16.00	1.00	7.16	10.00	3.00	5.94	8.00	1.00	3.81	4.88	
Glass bottles	8.00	1.00	2.56	4.00	0.60	2.17	8.00	0.40	1.97	2.21	2.02
Other Glass	4.00	0.10	1.58	3.30	0.40	1.44	6.00	0.80	1.98	1.83	

The figures show that the average selling price for paper from the households was about 5.7 peso/kg, aluminum about 34.4 peso/kg, other metals about 3.0 peso/kg, plastics about 5.7 peso/kg and glass about 2.0 peso/kg.

2) Prices at Business Entities Level

On the other hand, for business entities as generation sources, the selling prices were found higher than households in general, except papers. Table 2.6.15 summarizes the findings of surveys on the prices of recyclable materials sold by the business entities:

Table 2.6.15 Selling Prices of Recyclable Materials from Business Entities (in Peso/kg)

Recyclable Materials	Metro Manila			Metro Cebu			Metro Davao			Average	
	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.		
Old Newspapers	30.00	1.00	5.89	10.00	1.00	4.04	10.00	0.20	3.73	5.29	4.66
Old Corrugated Cartons	30.00	1.00	5.73	4.00	1.00	1.78	5.00	1.00	2.53	4.72	
White Paper	15.00	1.00	6.20	2.50	0.50	1.62	1.50	1.50	1.50	5.53	
Mixed Paper	11.00	0.50	3.22	2.50	1.25	1.87	-	-	-	3.10	
Aluminum cans	70.00	10.00	42.59	60.00	15.00	45.00	45.00	3.00	36.33	41.85	41.85
Other metals	10.00	1.00	4.69	5.00	1.00	3.25	10.00	0.10	2.98	4.20	4.20
PET bottles	20.00	1.00	13.37	15.00	10.00	10.00	12.00	1.00	3.91	10.87	10.05
Other plastic containers	20.00	5.00	10.65	15.00	6.00	10.33	12.50	0.50	4.63	8.88	
Other plastics	18.00	1.00	9.74	5.00	5.00	5.00	38.00	1.00	13.70	10.39	
Glass bottles	5.00	1.00	2.50	4.00	2.00	3.00	4.00	2.00	2.40	2.52	2.20
Other Glass	5.00	1.00	1.56	5.00	2.00	3.00	2.00	1.00	1.75	1.88	

The table show that the average selling price for paper from the business entities was about 4.7 peso/kg, aluminum about 41.9 peso/kg, other metals about 4.2 peso/kg, plastics about 10.1 peso/kg and glass about 2.2 peso/kg.

By comparing both the selling prices from households and business entities, average figures were computed as shown in Table 2.6.16, as the typical average selling prices of recyclable materials from generation sources. Papers were found sold at an average price of 5.19 peso/kg, plastics at 7.89 peso/kg, aluminum cans at 38.15 peso/kg, other metals at 3.58 peso/kg and glass at 2.11 peso/kg.

Table 2.6.16 Average Selling Prices of Recyclable Materials from Generation Sources

Recyclable Materials	Typical Selling Prices from Waste Generators (Peso/kg)		
	Households	Business Entities	Average
Papers	5.72	4.66	5.19
Plastics	5.72	10.05	7.89
Other metals	2.95	4.20	3.58
Aluminum cans	34.44	41.85	38.15
Glass bottles	2.02	2.20	2.11

(2) Prices at Primary Collector Level

The selling prices of recyclable materials collected by the primary collectors were also investigated in the surveys. The primary collectors surveyed were divided into street collectors, truck workers and landfill scavengers as one category, and Eco-aide as another category.

1) Street Collectors, Truck Workers and Landfill Scavengers

The selling prices of recyclable materials by the street collectors, truck workers and landfill scavengers surveyed are summarized in Table 2.6.17.

Table 2.6.17 Selling Prices of Recyclable Materials from Primary Collector

Type of Recyclables		Selling Price (Pesos/kg)						Average
		Max	Min	Manila	Cebu	Davao	Average	
Papers	Old Newspapers	10.00	1.00	3.00	3.50	3.50	3.28	2.12
	Old Corrugated Cardboard	6.50	0.50	1.73	1.86	2.20	1.88	
	White paper	10.00	1.00	4.92	1.50	0.00	2.63	
	Mixed paper	2.00	0.15	0.86	0.93	0.00	0.68	
Metals	Metal scrap (Aluminum)	70.00	5.00	47.23	48.00	38.33	45.35	45.35
	Metal scrap (Steel)	8.00	1.00	3.15	3.67	3.50	3.40	
	Metal Scrap (Others)	50.00	1.00	8.63	11.35	8.92	9.59	
Plastics	PET Bottles	25.00	6.00	13.85	12.36	12.29	12.99	10.55
	Other plastic containers	18.00	3.00	11.54	10.27	6.33	9.88	
	Other plastics	16.00	2.00	7.92	9.04	10.00	8.78	
Glass	Glass Bottles	9.00	0.33	2.04	2.99	2.78	2.60	8.94
	Other Glass	50.00	0.05	8.69	10.09	34.35	15.28	

It was found that the primary collectors were selling the papers collected at relatively low price in average at only 2.12 peso/kg, however the maximum and minimum price range recorded was similar

with the other paper prices identified. Aluminum cans were found sold at an average price of 45.35 peso/kg, other metals at 6.49 peso/kg, plastics at 10.55 peso/kg and glass at 8.94 peso/kg.

2) Waste Collectors (Eco-Aides)

Eco-aide is primary collectors but they are paying certain price for buying the recyclable materials from the generation sources, as well as collecting directly from the waste streams. Assuming that the buying price of Eco-aide is equivalent to selling prices from the generation sources, the selling prices of Eco-aide were investigated and summarized in Table 2.6.18 as follows:

Table 2.6.18 Typical Selling Prices of Recyclable Materials from Eco-Aide

Type of Recyclables		Selling Price (Pesos/kg)						Average
		Max	Min	Manila	Cebu	Davao	Average	
Papers	Old Newspapers	5.00	4.00	5.00	4.33	-	4.85	3.68
	Old Corrugated Cardboard	5.00	2.00	3.00	3.17	-	3.04	
	White paper	7.00	1.25	6.33	1.25	-	5.83	
	Mixed paper	1.00	1.00	1.00	1.00	-	1.00	
Metals	Metal scrap (Aluminum)	70.00	43.00	57.50	50.38	-	55.46	55.46
	Metal scrap (Steel)	6.00	2.50	4.10	3.15	-	3.78	11.38
	Metal Scrap (Others)	89.00	8.00	24.60	9.63	-	18.98	
Plastics	PET Bottles	20.00	10.00	16.78	12.30	-	15.18	11.66
	Other plastic containers	15.00	8.00	13.00	9.63	-	12.04	
	Other plastics	10.00	6.00	-	7.75	-	7.75	
Glass	Glass Bottles	4.00	0.60	3.80	1.34	-	2.04	1.26
	Other Glass	0.75	0.15	-	0.48	-	0.48	

As shown in the table, the average selling prices from the Eco-aide are 3.68 peso/kg for papers, 55.46 peso/kg for aluminum cans, 11.38 peso/kg for other metals, 11.66 peso/kg for plastics and only 1.26 peso/kg for glass.

(3) Prices at Junkshops, Traders and Middlemen

Junkshops, traders and middlemen (also known as consolidators) are widely different in terms of the business scale, and they are the intermediate recycling players between the primary collectors and the end users or recycling industries. Both the buying and selling prices of the junkshops, traders and middlemen were investigated, and the findings were summarized below with differentiation between junkshops as one category as smaller scale players, and traders and middlemen as another category as players of larger scale.

1) Junkshops

Results on the prices of materials at junkshops are summarized in Table 2.6.19 below:

Table 2.6.19 Typical Buying and Selling Prices of Recyclable Materials at Junkshops

Type of Recyclables	Buying Price (Peso/kg)				Selling Price (Peso/kg)			
	Manila	Cebu	Davao	Average	Manila	Cebu	Davao	Average
Old Newspapers	4.36	2.63	4.67	2.99	5.58	4.11	7.17	4.29
Old Corrugated Cardboard	3.14	2.00	4.99		4.30	2.74	6.02	
White paper	6.12	1.50	1.50		7.86	2.67	3.00	
Mixed paper	1.35	0.92	2.75		2.13	1.44	4.50	
Metal scrap (Aluminum)	58.85	51.10	50.20	53.38	67.75	62.26	61.60	63.87
Metal scrap (Steel)	9.48	3.97	3.52	14.45	11.69	5.62	4.37	15.97
Other Metal scrap	21.88	9.28	38.57		20.29	10.62	43.25	
PET bottles	15.51	10.54	9.88	11.35	19.93	14.00	0.00	13.21
Other plastic containers	13.81	9.57	11.08		17.46	12.66	15.00	
Other plastics	12.43	7.85	11.44		14.46	11.28	14.11	
Glass bottles	0.74	0.79	3.27	1.11	0.95	1.10	5.45	1.99
Other Glass	0.71	0.39	0.77		1.20	0.66	2.58	

The figures show that the average margins for the buying and selling prices at the junkshops are varied depending on the types of materials. Papers were bought at an average price of 2.99 peso/kg and sold at 4.29 peso/kg. Aluminum cans have a buying price of 53.38 peso/kg and selling prices of 63.87 peso/kg. The same margins of price increases from buying prices to the selling prices are also recorded for other metals, plastics and glass.

2) Traders and Middlemen

On the other hand, for traders and middlemen at larger scale, the buying and selling prices were surveyed and summarized as shown in Table 2.6.20, but it shows no big difference with the prices found at the junkshops.

Table 2.6.20 Typical Buying and Selling Prices of Recyclable Materials at Traders/Middlemen

Type of Recyclables	Buying Price (Peso/kg)				Selling Price (Peso/kg)			
	Manila	Cebu	Davao	Average	Manila	Cebu	Davao	Average
Old Newspapers	2.41	2.75	6.75	3.20	3.75	4.00	8.75	4.73
Old Corrugated Cardboard	0.84	1.82	5.69		1.28	3.63	7.14	
White paper	4.03	4.30	5.25		5.83	6.08	7.50	
Mixed paper	0.52	1.05	3.00		0.82	1.42	6.50	
Metal scrap (Aluminum)	49.62	29.58	57.50	45.57	58.46	42.33	65.38	55.39
Metal scrap (Steel)	3.52	2.06	6.30	5.85	5.14	3.04	5.45	6.96
Other Metal scrap	6.04	7.71	9.48		7.44	10.18	10.53	
PET bottles	14.00	10.71	11.86	10.87	17.17	13.21	15.40	13.69
Other plastic containers	13.40	9.58	13.25		16.30	11.69	16.67	
Other plastics	6.78	6.33	11.95		9.29	8.83	14.67	
Glass bottles	0.53	1.89	1.14	0.86	0.69	1.25	1.78	0.96
Other Glass	0.70	0.44	0.44		0.84	0.51	0.71	

3) Summary of Prices at Micro Scale

By summarizing all the figures identified on the buying and selling prices at all stages of recycling,

typical prices of recyclable materials were computed and illustrated in Table 2.6.21 below.

Table 2.6.21 Typical Prices of Recyclable Materials at Different Stages

Recyclable Materials	Typical Prices at Different Stages (Peso/kg)				
	Households/ Business Entities	Primary Collectors	Eco-Aide	Junkshops / Traders /Middlemen	Recycling Industries
Papers	5.19	2.12	3.68	4.51	
Aluminum Cans	38.15	45.35	55.46	59.63	
Steel Cans / Other metals	3.58	6.49	11.38	11.47	
Plastics	7.89	10.55	11.66	13.45	
Glass	2.11	8.94*	1.26	1.48	

*Remark: * High price of glass was recorded in surveys at Davao for other glass at 50 peso/kg*

2.6.6 Problems Encountered and Recommendations

(1) Household and Business Entities and Institutions

1) Segregation of Recyclable Materials

Households and business establishments mentioned the different problems when it comes to segregation of recyclables. It was mentioned that some households and even business entities do not segregate because it is time-consuming and at times is a very tedious activity. They feel that they have far better things to do rather than spend time with this kind of activity. It was also mentioned that some recyclable materials are hard to segregate. The lack of extra garbage receptacles or bins for recyclables was also mentioned wherein household members or employees would like to have a particular container to dispose or place these recyclable materials.

The lack of discipline by the people was also stated as well as the manner of garbage collection. Household members said that even if they segregate, the garbage collectors would still mix them inside the collection trucks.

2) Sale of Recyclable Materials

With regards to the sale of recyclable materials, several issues were stated. Household members mentioned that most of the time, Eco-aides would have very low buying prices, not to mention that some Eco-aides are also choosing what to buy. Sometimes, there would be no buyers resulting to the stockpiling of materials on households or at offices.

3) Other Problems

Other problems mentioned are the infrequent garbage collection as well as the need for information dissemination among communities and business establishments to further promote recycling activities.

4) Comments / Suggestion

Suggestions vary from creating programs to advance the recycling activities as well as the improvement of the garbage collection covering the residential and commercial establishments. A stricter implementation of the provisions of RA9003 in particular with the recycling activities is also strongly suggested.

(2) Primary Collectors and Middlemen

1) Collection of Recyclable Materials

Primary collectors and Eco-aides experience various problems in collecting recyclable materials from different sources. Some of them complain on the quality of materials that they are collecting, which in most cases are either dirty or damaged. These damaged recyclables are most of the time not being bought by junkshops or traders.

Big junkshops and consolidators also experience problems regarding the collection and transport of recyclable materials. In particular, the collection vehicles are often caught by traffic enforcers for overloading. This is a common dilemma for junkshops considering that a vital part of their operations is the transport of materials to different trading partners.

2) Segregation of Recyclable Materials

In terms of segregation of collected recyclable materials, this particular activity is conducted within the premises of each junkshop or consolidator. This is an important process for scrap dealers for it is a must that each material should be segregated accordingly before selling to a bigger consolidator or recycling industry. However, there are problems that occur in the conduct of this activity such as the difficulty in the proper segregation because of the presence of different compounds that are mixed together with the recyclable materials. Most often, the recyclables become unusable due to the difficulty in removing the unwanted parts. Also, the discipline among the workers is a problem as well. The proper segregation also depends on the effectiveness of the workers in the junkshops.

3) Sale of Recyclable Materials

In relation with the sale or trading of recyclable materials, most junkshops cited the mode of payment of their partners as one of their problems. As mentioned in the questionnaire, the issuing of checks delays the capital circulation. Some payments are also made on an installment basis which does not contribute well in the day to day operations of the junkshops.

Another problem stated is the bribery of some local government officials. This problem is a common practice in the Philippines. Even small players are victimized by this practice that brings forth the failure of businesses, in some cases.

4) Other Problems

Various other problems were mentioned by junkshops, focusing mainly on their dilemma with consideration to their daily operations. One major problem is the presence of illegal or underground junkshops which are quite rampant. These establishments serve as competitors to legitimate junkshops, wherein they enjoy the same trading activities despite not paying the proper taxes for their operations. High business taxes are also a problem for this adds up to the capital expenses of the junkshop owners.

5) Comments / Suggestions

Junkshop owners would also like to recommend the strict implementation of RA 9003. They are still hoping that the government would support them in their efforts and that policies would be implemented accordingly in order to create more programs for recycling activities.

The collectors on the other hand would like to have a standardization of prices for recyclable materials. They are quite uneasy with the fluctuating rates which happen very often.

(3) Recycling Industries

1) Collection of Recyclable Materials

Recycling industries usually collect the bulk volume of raw materials from consolidators or junkshops. However, problem occurs mainly on the selling prices wherein some consolidators tend to give higher rates for most of the time, they are the ones who dictate the rates. Also, some recycling industries experience scarcity in the collection of raw materials. This greatly affects their production and thus is a major problem as well.

2) Segregation of Recyclable Materials

In the segregation of materials, one problem cited was the inadequacy of storage areas for the collected materials. Another problem mentioned was the quality of recyclable materials wherein in some cases, the said materials were not properly segregated and needs further sorting which tends to be a time-consuming task. Some recyclables are found to be mixed with unacceptable or unusable materials which are very hard to remove or separate.

3) Processing of Recyclable Materials

In the processing of the recyclable materials, recycling industries complain about the quality of raw materials that get from their suppliers. Some are very poor in quality which contributes to the further breakdown of machineries and equipment. Since some machinery are quite old and have been used for a considerable amount of time, inefficiency and eventual breakdown are common occurrence. Most recycling industries can not afford to readily buy a replacement for this would entail a great amount of investment cost.

4) Other Problems

The mode of payment, which is in some cases made by the issuance of checks, is a problem for recycling industries. This causes delays in the receipt of payments which are needed for the daily operations and other transactions as well. The lack of investment or capitalization is also a problem for most recycling industries. The production of recyclable goods requires a lot of expenses. Buying of raw materials and expenses incurred by marketing and sales are another source of capital expense for recycling industries.

5) Comments / Suggestions

Recycling industries would also like to see a stricter implementation of RA 9003. Also, creation of programs and incentives by the government with regards to recycling activities is also suggested by the industries. Another important suggestion is the regulation on the importation of raw materials. This is important most especially for industries which rely heavily on the importation of raw or virgin materials from other countries.

(4) Importers and Exporters

1) Import/Export of Recyclable Materials

There are a number of issues raised by importers and exporters of recyclable materials regarding their operations and day-to-day activities. One of which is the high tariffs and taxes that they have to pay with the import and export of raw materials, not to mention the high shipment cost. Importers/exporters are also affected by the fluctuating dollar rate. This heavily affects trading with foreign partners. Another issue is the “red tape” or long processing of required permits from various government offices. The interruption in the shipment is sometimes caused by the delay in the issuance of the permits.