The Philippine Environmental Governance 2 Project

STUDY ON THE MARKET FOR RECYCLABLE SOLID WASTE MATERIALS IN MINDANAO



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ACRONYMS

ADB	-	Asian Development Bank
ARMM	-	Autonomous Region of Muslim Mindanao
DENR	-	Department of Environment and Natural Resources
DOST	-	Department of Science and Technology
ESWMA	-	Ecological Solid Waste Management
GSO	-	General Services Office
HDPE	-	High Density Polyethylene
HIPS	-	High Impact Polystyrene
ISTEA	-	Intermodal Surface Transportation Efficiency Act
ISWM	-	Integrated Solid Waste Management
LABs	-	Lead-Acid Batteries
LDPE	-	Low Density Polyethylene
LGUs	-	Local Government Units
LGC	-	Local Government Code
MRFs	-	Material Recovery Facilities
NGO	-	Non-Government Organization
OCC	-	Old corrugated cartons
ONP	-	Old newspapers
PET, PETE	-	Polyethylene Terephthalate
PP	-	Polypropylene
PPCP	-	Polystyrene Packaging Council of the Philippines
PS	-	Polystyrene
PVC	-	Polyvinyl Chloride
RA	-	Republic Act
SWAPP	-	Solid Waste Association of the Philippines
SWM	-	Solid Waste Management
UBC	-	Used beverage cans
US EPA	-	Unites States Environmental Protection Agency
WACS	-	Waste Assessment and Characterization Study
WB	-	World Bank

EXECUTIVE SUMMARY

The passage of the Ecological Solid Waste Management Act (ESWMA), or Republic Act 9003, has significantly pushed local government units (LGUs) to integrate recycling as an essential component in their Integrated Solid Waste Management (ISWM) Plans. The Act's mandate on 25 percent waste diversion has brought recycling to be a major activity of LGUs' SWM programs. Most importantly, the urgent need to address SWM problems and limited resources of the LGUs have led to recognizing the important role of the existing informal recycling sector to contributing to the targeted 25 percent waste diversion. With recyclable solid waste materials accounting for 18 percent of the total solid wastes generated, on the average, increasing recycling activities will prove to be a strategic SWM course of action that will divert solid wastes from dumpsites.

Though recycling activities are thriving and indicators signal emerging markets for recyclables, the present situation of the recyclables market in the country have still to be harnessed. This is the same scenario of the recyclables market in Mindanao, specifically in the 10 major urban centers, including Isabela City, Ipil, Pagadian City, Zamboanga City, Davao City, Cotabato City, General Santos City, Kidapawan City, Koronadal City and Tacurong City.

This **Study on the Market for Recyclable Solid Waste Materials in Mindanao** identifies 229 junkshops, 22 consolidators and 13 processors within the 10 sites selected for the study. From among these, Davao City and General Santos City have the most number of junkshops. Major consolidation nodes of recyclable solid waste materials in Mindanao are Zamboanga City for Western Mindanao and General Santos City and Davao City for Southern Mindanao. All processors are located in Davao City, except for one which is situated in Tacurong City.

The study highlights the major types of recyclable solid waste materials traded in Mindanao that include scrap metals, glass containers, plastics, paper and used lead-acid batteries (LABs). To note, scrap metals are the most commonly traded recyclable materials while LABs are the least traded. Specifically, 83 percent of the total volume of recyclable materials recovered monthly by consolidators (excluding used lead-acid batteries) are metals while only 10 percent are glass containers, 4 percent plastics and 4 percent paper. A major finding of the study reveals that Zamboanga City is the major consolidator of scrap metals where 60 percent of the total scrap metals recovered are brought in bulk by consolidators situated in this City. Only 25 percent and 13 percent of the total recovered metals are consolidated in General Santos City and Davao City, respectively. Further, the study results show that bulk of the glass containers (59%) and plastics (54%) are consolidated in General Santos City. Davao City ranks second in the purchase of these recyclable materials from junkshops, 27 percent and 26 percent of total glass containers and plastics, respectively. On the other hand, Davao City consolidators receive 80 percent of the total waste paper recovered. Zamboanga City, recovering 67 percent, serves as the major consolidator of used lead-acid batteries while Davao City is the second major consolidator of this recyclable material, recovering 29 percent of the total volume bought by consolidators surveyed.

Processing of recyclable solid waste materials has been found to be limited within Mindanao. Existing processing activities in Davao City are engaged in producing plastic twines and pellets; plastic household items such as plastic pails and basins; plastic corner posts, polypropylene polystraps and mouldering items; aluminum cooking pots and other kitchen utensils; and recycled corrugated boxes, and fruit and egg trays. In Tacurong City, a processor produces ground plastics from recyclable plastics and transports them to Davao City for production of twisted twines and pellets. No glass processing is situated in any of the regions included in the study. All recyclable

glass containers collected by consolidators are brought to Manila for processing. No processor for used lead-acid batteries has been found in any of the sites but a re-user in Zamboanga City repairs used lead-acid batteries and re-conditions these for sale with the same warranty as new ones.

Furthermore, the study shows that income from recycling is relatively high. Substantial income is earned from recyclables trading at the junkshop level. On the average, the average monthly operating income (i.e., income from sales less cash operating expenses) of junkshops is approximately PhP149,599 per month which is approximately PhP1.7 million per year The average monthly operating income from scrap metals comprise the largest share (about 86 percent or PhP128,374) of the junkshop's monthly total operating income. The share of glass containers total operating income is approximately 10 percent (or PhP15,778), plastics about 2 percent (or PhP3,216), and waste paper about 2 percent (PhP3,721). On the average, monthly operating income of consolidators is approximately PhP824,243 (Table 26). The consolidators in Zamboanga City and General Santos City have operating incomes that exceed PhP1 million per month. Davao City consolidators earn about PhP795,779 per month. The distribution in operating income per recyclable among consolidators follows a similar distribution for junkshops.

Though recyclables market in Mindanao has been profitable, the study emphasizes that the market still needs to be developed. For both junkshops and consolidators, the trade in scrap metals is the most profitable among the recyclables. The income from scrap metals is approximately 90 percent of the total operating income. For some small junkshops, income from scrap metals offset the loss (negative income) from other recyclables. This means that recyclables trade in the 10 sites is shaky and could potentially collapse if the demand for scrap metals fall (especially the demand from abroad) and if the supply of scrap metals dwindles. In addition, there is a very high market potential for plastics, especially PET, due to the establishment of a number of processing plants in several areas in the country for food grade plastic containers. If the local supply of waste plastics could not meet the expected increase in the capacity to domestic processing, it is likely that these newly established plants resort to either sourcing regionally (within Asia) or using more virgin raw materials. For recycled paper, Asia and Australia are the biggest markets for Europe and US. Thus far, the recovery and the market flow of paper and plastics from the 10 sites do not indicate a significant share in the domestic and international markets.

The development of the recyclables market in Mindanao is challenged by the following problems: insufficient available reclaimed materials; poor quality of recyclable materials recovered; lack of storage capacity; frequent fluctuation in prices of recyclables; inability of the junkshops and consolidators to meet the volume requirement of buyers; lack of capital and/or access to financing; high costs of operation (i.e., high cost of fuel and rent); and stiff competition among junkshop operators and consolidators. To facilitate developing the recyclables market in Mindanao, the study recommends maximizing existing material recovery system through profiling of players in the existing materials recovery system, organizing junkshops and consolidators into associations, conducting recycling-related trainings, strengthening market linkages among informal recyclers, and increasing access to financial assistance, and issuing recycling-related local policies on mandatory waste segregation, developing recycling plans, strictly implementing registration/licensing/giving of business permits for junkshops, and segregating and recycling program in local government offices. Finally, national and local government units can increase the demand for recycled products through legislations in government procurement policy, recycled content agreement, economic incentives and, zoning and licensing.

STUDY ON THE MARKET FOR RECYCLABLE SOLID WASTE MATERIALS IN MINDANAO

I. INTRODUCTION

A. BACKGROUND

Solid Waste Management (SWM) has been a critical environmental issue in the country. The increasing population and economic activities have resulted in rising solid waste generation that has affected not only the environment but also public health. With the passage of the Local Government Code (LGC) of 1991[1], local government units (LGUs) have been challenged by the need for a strong political will, an integrated SWM approach, strict enforcement, increased community and private sector participation, and financing sources for effective and efficient delivery of SWM services. Thus, the Ecological Solid Waste Management Act (ESWMA) of 2000, or Republic Act (RA) 9003, attempts to provide a framework for LGUs to develop and implement an SWM program that harmonizes strategies for source reduction at source, collection and transport, materials recovery and disposal management. Specifically, the Act provides for an adoption of a 10-Year Integrated Solid Waste Management (ISWM) Plan that will target: waste diversion of at least 25 percent total wastes generated by 2005 to increased waste diversion in the succeeding years; conversion of open dumpsites to controlled dumpsites by 2005, then to sanitary landfill by 2007; institutional structure necessary for the implementation of the Act; incentives for LGUs, private sector and NGO participation and adoption of user-fee principles.

While the Act gives guidelines on collection, disposal management, institutional arrangements and financing mechanisms, the mandate on 25 percent waste diversion remains to be its central target that will significantly impact reduction of cost requirements for collection and disposal activities. In a Waste Assessment and Characterization Study (WACS) of 42 LGUs conducted by Philippine Environmental Governance (EcoGov) Project 2, results show that LGUs have high potential waste diversion since 60 percent of the total wastes generated are biodegradable, while 18 percent are recyclable. Only 17 percent of the wastes generated are residual and should go to dumpsites. The remaining wastes generated, 5 percent, are special wastes.

At present, materials recovery activities, particularly recycling, still have to be harnessed. Most of the 10-Year ISWM Plans developed by LGUs highlight the establishment of Materials Recovery Facilities (MRFs) at the barangay level and a central MRF at the city or municipal level as a priority strategy. These MRFs are intended to receive wastes not only for composting but also for recycling. Effectiveness and efficiency of these barangay/LGU-initiated MRFs depend largely on the presence of buyers for the recyclables at this level or the presence of consolidators who are willing to collect the recyclables from these facilities given the limited capacity of the barangays and some LGUs to transport their recyclables to various markets. It should also be noted that a private recycling sector already exists which allows trading of recyclable solid waste materials

[1] The passage of the Local Government Code (LGC) of 1991 paved the way for the devolution of service delivery, including solid waste disposal system or environmental management system or services or facilities related to general hygiene and sanitation (LGC, Section 17).

among point sources (households, commercial establishments and institutions) junkshops, consolidators and processors. An Asian Development Bank study on SWM in Metro Manila showed a thriving recycling activity and demonstrated that a clear market for recyclables exists. *Linis-Ganda*, a Manila-based junkshop cooperative program servicing 17 municipalities, is an example of successful junkshop cooperative that employs about 3,700 eco-aids who earn at least PhP200–740 daily.[2] At present, these cooperatives have organized themselves into a federation. Despite the presence of more organized recycling activity, still, only 10.7 percent of Metro Manila's solid wastes are recovered. The rest goes either to the city's dump sites, illegal dump sites on private land, rivers, and creeks, or are openly burned.[3] The same study indicates that the demand for recyclable materials is not met by the locally available supply. For instance, a large paper recycler in Metro Manila is able to get only 10 percent of the total recyclable paper requirements for its operations. Even with the meager recovery figure of 11 percent, there is a clear indication of an emerging market for recyclable materials and the opportunity to increase recovery and recycling efforts, as well as to expand existing markets and develop emerging ones.

In Mindanao, earlier SWM study of the Project indicates that in five cities (Isabela, Pagadian, Kidapawan, Koronadal and Tacurong) and seven municipalities (Lamitan, Buug, Ipil, Wao, Kalamansig, Lebak and Isulan), on the average, 16 percent of the total wastes generated are recyclable, while 66 percent are biodegradable, 16 percent residual and 2 percent special wastes. Waste sources that contribute the most to the volume of recyclable solid wastes are the households, the central business district (CBD), and the public market. On the average, 80 percent of the total recyclable wastes in the Mindanao LGUs covered by the study are generated by households while 13 percent come from the CBD, including general stores, service centers, food establishments, industries and recreational centers. On the other hand, public markets contribute 6 percent recyclable wastes. The remaining recyclable items are from institutions and special waste generators.

At present, there is no estimate of the extent of the recycling effort, the maximum recycling potential and the mechanisms which facilitate operation of the recyclable market. Therefore, examining the recyclable market in Mindanao will help in strengthening the existing recycling activities initiated by the LGUs and the private sector, including junkshops, consolidators and processors. This study, then, seeks to understand the said market for recyclable solid waste materials in a regional context by identifying the demand for recyclable waste materials, specific recyclable materials traded, available regional supply of these materials, existing market flow of the goods traded, present problems within the market and functional institutional mechanisms operating in the said system. Ultimately, the study intends to provide recommendations on enhancing the potentials of the recyclables market, given the present situation, by suggesting courses of actions related to LGU support activities, providing market information, improving product quality and establishing linkages among key stakeholders, among others.

[2] Camacho, Narda, 2003, Solid Waste Management–The Manual. Metro Manila Linis-Ganda, Inc. Quezon City.

[3] Westfall, Matthew and Nicholas Allen, 2004,The Garbage Book: Solid Waste in Metro Manila. Asian Development Bank. Mandaluyong City, Metro Manila.

B. OBJECTIVES OF THE STUDY

This Study on the Market for Recyclable Solid Waste Materials in Mindanao aims to provide LGUs and other concerned government agencies with information that can be used in designing policies and programs that will facilitate the development of the existing recyclable market as integral part of their ISWM Plans. By looking into the activities of the recyclables market within the 10 major urban centers in Mindanao, including Isabela City, Ipil, Pagadian City, Zamboanga City, Davao City, Cotabato City, General Santos City, Kidapawan City, Koronadal City and Tacurong City, the specific objectives are:

1) To determine the type and quantity of recyclable materials generated, recovered and marketed by major junkshops in the 10 urban centers;
2) To investigate the flow of recyclable materials, thereby identifying major players, in these urban centers and analyze how the recyclables market operates—including information on marketing, pricing, financing, as well as the problems and issues faced by the recyclers, and the potential barriers to market development;
3) Identify potential areas for intervention by LGUs and other concerned agencies to promote the development of the recycling market;
4) Identify, provide information on and prepare a directory of major consolidators and processors in Western and Southern Mindanao that LGUs can use in designing strategies and programs related to developing their recyclables market.

C. SCOPE, LIMITATION AND METHODOLOGY OF THE STUDY

This study examines the market for recyclable solid waste materials by looking at the demand for these items and available local supply. It traces the flow of these recyclables from the junkshops, which is the major primary collection point, to the consolidators which buy recyclables collected by junkshops to be sold to the processors that process these materials into new products. While the study attempts to evaluate the existing demand for recyclable materials and their location by aggregating the volume of recyclables sold by junkshops to consolidators and those items purchased by the processors from these consolidators, it does not identify recycling rates for regions/LGUs included in the study or potential market waste diversion and market demand.

A major point, too, that should be mentioned as a limitation of the study is its focus on investigating the market aspects involved between collection and processing/manufacturing stage only of the whole process of recycling, including prices, product requirements and volume traded, without looking into the market aspects from the processing/manufacturing state to the consumption/purchasing stage of the recycled products. To be specific, market aspects examined in the study refer to types of recyclable materials traded, their prices and commodity flow. Furthermore, the study does not intend to measure actual aggregate volume of recyclable materials recovered and recyclable materials going out of the market flow from junkshops to processors. Also, it should be highlighted that though the study focuses on recyclable materials, discussions include solid wastes that are for re-use. Thus, for the purpose of this paper, "recyclable" shall refer to solid waste materials to be recycled and to be re-used.

Most importantly, the study aims to evaluate a recyclables market within a regional context, i.e., in Mindanao, but is limited to studying selected LGUs in Western and Southern Mindanao (Isabela City, Ipil, Pagadian City, Zamboanga City, Davao City, Cotabato City, General Santos City, Kidapawan City, Koronadal City and Tacurong City) since these are the cities where most of the region's economic activities are situated, thereby, being preferred for locations of

consolidators and processors. For one, Zamboanga City, Davao City and General Santos City are recognized as Mindanao's centers of commerce due to the presence of more advanced infrastructure (e.g., port facilities, banking and finance) compared to other smaller cities in the island.

Furthermore, the study's recommendations are built only on the recyclable marketing problems and issues identified by the junkshops, consolidators and processors surveyed. They neither include challenges encountered by barangay/LGU-led recycling activities related to marketing recyclable materials nor provide future actions planned by the LGUs to improve existing marketing activities for recyclable materials.

For the survey, the lists of recyclers from the local government unit licensing office and the Department of Trade and Industry were used as basis for identifying junkshops, consolidators and processors. The lists were verified by physically identifying the listed establishments and adding unlisted ones.

The study used semi-structured survey questionnaires for junkshops and consolidators, and in-depth interviews for processors to gather information on the types of recyclables traded in the 10 urban centers, volume, prices, cost and revenues from recycling, products, and the location of markets. Waste generation and local government policies and programs were taken from published and unpublished materials and key informant interviews, such as the LGU solid waste management plans and ordinances. Key informant interviews, in particular, were a rich source of information in looking at community recycling programs, issues, and private sector initiatives.

II. DEFINITION OF TERMS

1. **Solid wastes** - all discarded household, commercial waste, non-hazardous institutional and industrial waste, street sweepings, construction debris, agriculture waste, and other non-hazardous/non-toxic solid waste.

2. **Re-use** - the process of recovering materials intended for the same or different purpose without alteration of physical and chemical characteristic of the recovered material, e.g., re-using bottles, plastic and other containers; using back of "used paper"; using newspapers for wrapping and packing materials.

3. **Recycling** - the treatment of used or waste materials through a process of making them suitable for beneficial use and for other purposes. The process of recycling *transforms* recovered or reclaimed solid waste materials *into new products* in such a manner that the original products lose their identity. These new products may be consumer goods or raw materials for the production of similar goods. It involves collection of the recyclables from the waste stream, processing or manufacturing of these recovered materials into new products, and purchase or consumption of these products.

Box 1. Reuse and Recycling
The distinction between re-use and recycling is, therefore, easy to make, referring to its structure and state. If the waste object is going through re-processing during which process its structure or state is going to change, the process is recycling. If between several uses, the structure and state of the object remains the same, the process is re-use.

4. **Reconditioning-** may be necessary before re-use, e.g., washing bottles between uses; however, this processing does not change the recovered wastes, e.g., bottles, structure.

5. **Recyclables** - materials that still have useful physical or chemical properties after serving their original purpose and that can, therefore, be reused or remanufactured into new products; any waste materials retrieved from the waste stream and free from contamination that can still be converted into suitable beneficial use or for other purposes. Generally, materials that have recycling potential are those that can be collected in quantity, free of contamination, and which can be economically transported to a processor or end user.

6. **Junkshops** - traders of a mix of recyclable materials primarily bought from itinerant collectors, waste pickers and households.

7. **Consolidator** - any establishment or business entity which collects, temporarily stores and transports recyclable materials by bulk to the processing/ recycling sites or centers.

8. **Processors** - any establishment or business entity which either manufactures new products from recyclables or transforms them into products used as raw materials for the manufacture of similar or other consumer goods.

III. REVIEW OF RELATED LITERATURE

The market for recyclable solid waste materials has already existed even before national and local governments have exerted efforts in seriously assessing the said market. In a review of the US recyclables market in the Decision Makers' Guide to Solid Waste Management, United States Environmental Protection Agency (US EPA) recounted that "recyclables have been collected from non-municipal sources, especially industry, for a very long time, exceeding one to two hundred years in some cases."[4] Records show that recycled waste materials of 6 million tons in 1960 dramatically increased to 30 million tons in 1992. With the US recyclables market being characterized as composed of intermediate (collectors, processors, brokers and converters) and end-use (companies using recyclable materials as inputs to manufacturing new products) markets, buyers and sellers of recyclable solid wastes are linked for efficient trading of major recyclable items, including paper, glass, plastic, metals and tires. Specifically, recyclable paper and paper products were traded among local processors and brokers for sale to domestic and export paper mills. These were often used in manufacturing newsprint, chipboard, kraft liner board, corrugating medium and tissue products. Export of recyclable paper and paper products had also been a major trading activity of US recyclables market due to economic growth in the Pacific Rim nations. Japan and South Korea are major export destinations of these recyclable paper and paper products. Recyclable glass containers were mostly reprocessed within the country into new clear, green and brown glass jars and bottles. Only a small percentage of collected recyclable glass containers reached the outside markets, Canada and Mexico. For recyclable plastic, the review highlighted the development of the market for post-consumer high-density polyethylene (HDPE) and polyethylene teraphthalate (PET) plastics, especially HDPE milk jugs and clear PET plastics whose demand had significantly increased. At the time of the study, the market for recyclable plastics was the least developed among recyclables. While the market for recyclable plastics was poor, ferrous and nonferrous metal markets were found to be the most stable of the recyclable materials. Ferrous scrap included autos, household appliances, equipment, bridges, cans, and other iron and steel products. Aluminum, copper, lead, tin and precious metals were categorized as nonferrous metals. With the establishment of the Steel Recycling Institute in 1988, recycling efforts of steel mills have relatively increased. Recycling of tire, one of the major recyclable items traded in the US, was supported by the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 which mandated states to achieve minimum utilization requirements for asphalt with recycled rubber in federally funded transportation projects. Federal highway funding was reduced for those which were unable to meet the said requirement.

Box 2. Key Players in the US Recyclables Market

- **Collectors/Haulers:** companies that collect recyclables or waste haulers which have engaged themselves in collecting recyclables from residents and businesses
- **Processors:** companies that accept and modify recyclables from residential or business sources by sorting, baling, crushing or granulating; include local, private buy-back centers and privately or publicly operated MRFs; sell to other intermediate buyers or domestic end-use markets and do not generally use export markets
- **Brokers:** companies that buy and sell recyclable materials, with the materials' shipping arrangements, from one location to another by collectors or processors, being part of their services; generally sell to converters or to end-use markets and commonly export materials to foreign countries
- **Converters:** companies that take recyclable materials in raw form and alter them so they are readily usable by a manufacturer, e.g., a company that produces pulp from paper which is then used by a paper mill
- **End-Use Markets:** public or private sector entities that buy recovered materials from different sources then use these materials as inputs to manufacturing a new products (US EPA, 1995)

[4] US EPA, Solid Waste and Emergency Response, 1995, *Decision-Makers' Guide to Solid Waste Management, Vol. 2*. Washington, D.C.

Central to the discussion of the review was the implementation of several policies, incentive systems, technology advancements, studies and advocacy campaigns which improved the recyclables market. Among these were: mandatory recycling laws and disposal bans which increased the supply of recyclable materials; regulatory mechanisms such as recycled content mandates, environmental standards, recycled product labeling laws and requirements to buy recycled products intended to results in rising demand for recyclable materials; giving of tax incentives, rebates, and grants and loans to recyclers to encourage more recycling activities; new technologies, including introduction of de-inking technology which allowed a mix of 10 to 30 percent magazines with old newsprint, manufacture of recyclable self-adhesive sticky labels that increased demand for office wastepaper, de-tinning facilities which explored the market for tin-plated steel and bimetal cans and development of plastic lumber that expanded the mixed-plastic resin recycling; conduct of linkage study and market information sharing that paved the way for improving recyclables market operations; and education programs that enhanced public and private sector participation in market development.

Locally, a recent study of the Department of Environment and Natural Resources (DENR) and Asian Development Bank (2003)[5] examined the current market for recycled solid waste materials in Metro Manila. Of the 2 million tons of recyclable materials estimated to be generated, only 30 percent was recovered by Linis-Ganda, a federation of junkshops and eco-aides in the 17 municipalities of Metro Manila. Major recyclable items collected by Linis-Ganda were old newspaper, waste paper, carton, broken glass, plastic and metal. The first three contributed to more than half of the total purchases of Linis-Ganda which amounted to P232 million in 2002. The levels of recyclables market in Metro Manila were structured into four. The first level was composed of the eco-aides who bought the recyclable materials from point sources like households. These recyclable materials were then sold to junkshop operators (2nd level) then to junkshop dealers or consolidators (3rd level) and finally, to the recycling plants or factories (4th level) where almost a hundred companies were into recycling in Metro Manila. Also key players of the recyclables market were recyclers' associations, e.g., Pulp and Paper Manufacturers Association and Metro Manila Plastic Recyclers Association, which bought the recyclable items in bulk to be sold to recycling companies.

The study highlighted the high demand for waste paper materials which could not be supplied locally. There was also a large market for plastics but were of low bulk density and had low buying prices at first marketing level. With the objective to boost market for plastics, a PET Recycling Task Force was organized by companies producing PET bottles with the Department of Science and Technology (DOST). This was the same scenario for polystyrene (PS) plastic products that had high cost of retrieving and transporting the materials to a site in Bulacan. The latter was established by the Polystyrene Packaging Council of the Philippines (PPCP) with financial assistance from the World Bank (WB).

The need to develop the recyclables market in Metro Manila was attributed to the following factors: 1) poor quality of recyclable materials collected due to non-segregation of wastes, thus, increasing contamination of the items and resulting in low buying prices; 2) limited capital of eco-aides buying the recyclable materials from point sources like households; 3) limited pushcart capacity of eco-aides which limited buying time and items bought to less bulky materials but with same prices of materials with higher prices; and 4) distrust towards eco-aides and waste pickers.

[5] Department of Environment and Natural Resources, and Asian Development Bank, 2003, Report No. 5c Study of Markets for Recycled Solid Waste. Asian Development Bank-Metro Manila Solid Waste Management Project. Pasig City.

In a related survey of DENR and ADB on junkshops[6], findings show that a large number of junkshops accepted HDPE plastics. HDPE materials collected were from products like shampoo, cosmetics, motor oil containers, toothpaste tubes, sand bags, soap dishes, ice cream containers, pallets, food industry crates and trays. Plastics costs ranged from P1 to P7 per kilogram. On the other hand, a market existed for glass and bottles bought in whole, and for broken glass and bottles. Whole and broken bottles are bought by San Miguel Corporation, Pacific Glass Company and Republic Glass. Table 1 presents buying prices of these items.

Table 1. Buying Prices of Recyclable Glass in Metro Manila, 2003

Type	Price Range (PhP)
Whole empty glass and bottle of soft drinks and wines	0.50 – 1.50/piece
Whole medicine and food bottles	0.10 – 0.20/piece
Colored broken bottles	0.10 – 0.20/piece
White broken bottles	0.50 – 1.00/piece

Source: DENR-ADB, 2003

For metals, items collected for recycling were aluminum, copper, alloys, brass fender, washers, GI sheets and zinc. Copper had the highest buying price among all the metals traded. Types of paper bought for recycling were assorted paper, newspaper, cardboard, magazine and office paper. Among these waste paper, the highest price was quoted for newspaper, ranging from P0.30 to P5.50 while assorted paper had the lowest buying price. Market for computer cartridges was limited since only a few junkshops were found receiving these items. Prices ranged from P3 to P15 per kg. The status of market for batteries was the same where only batteries of motor vehicles were accepted by junkshops, with 2SM being the most common battery bought by junkshops at P50 to P70.

The study identified four major issues related to junkshop operations which include: non-involvement of local SWM body in the approval process of junkshop permits/licenses; unregistered junkshops; lack of standard regulation on the operation; and illegal practices such as child labor and collection of hazardous materials. Addressing these, recommendations outlined are: 1) imposition of minimum building standards and management practices for junkshops; 2) strict enforcement of policies on sanitation, health and safety; 3) operation of an MRF in the barangay or cluster of barangays; 4) registration of junkshops; and 5) extension of financial assistance to junkshops.

[6] Ibid.

IV. CONCEPTUAL FRAMEWORK

Recycling is a three-step process: collection, processing or manufacturing, and purchase and use (Figure 1). Collecting used materials, the important first step, involves three basic steps: source separation, collection in various ways (curbside, buy-back centers, or permanent collection sites like MRFs), and hauling to processing destinations or final market.[7] The second step involves using recovered materials as feedstock in the manufacture of new products. This is where processing technologies play a crucial role. The final step is purchasing and using the recycled products. Merely collecting and processing recyclables is not considered recycling—these recovered materials must be reutilized as the source of raw materials for new consumer or commercial products.[8] Thus, viable markets for the sale of recyclable materials are essential in any recycling program.

Figure 1 also shows that solid waste collection and recycling are businesses, subject to the same economic laws and tendencies of any other type of industry. Solid waste and recycling products and services are *bona fide* products, saleable and purchasable on a market. Hence, recycling is also subject to the laws of demand and supply. Waste materials are traded if the market for these materials exists. Trading occurs if there is a demand for recycled products—i.e., consumers buy recycled products or manufacturers use recyclable materials as inputs in producing other goods—and the market can supply the demanded materials. Without clear market and demand for recycled products, potentially recyclable wastes end up in dumpsites and landfills as part of the residuals.

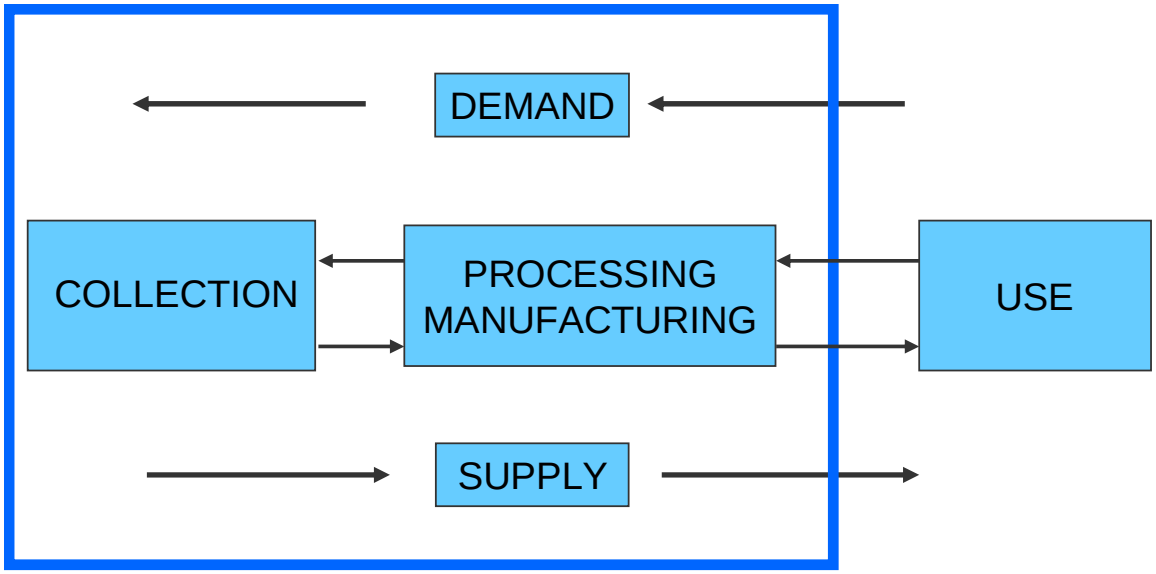

Figure 1. The Recycling Market Framework

To present a comprehensive review of the business of recycling, a study of the market may be organized into three major parts: markets, marketing, and market development. There are three ways to look at recycling markets: activity/services performed, geographic location of market, and type of recyclables being marketed. Figure 2 below shows market flow of recyclable materials. Junkshops source their recyclable waste materials from various sources, namely:

[7] US EPA, Solid Waste and Emergency Response, 1994, *How to Start or Expand a Recycling Program.* Washington, D.C.
[8] Rogoff and Williams 1994.

households who sell their recyclables directly to the junkshop, waste pickers, itinerant buyers or those that buy directly from households and other establishments, dump truck workers—who sort and sell recyclables from the collected wastes, and from institutional sellers or establishments and offices that sort recyclables and sell them to recyclers. Junkshops sell to consolidators and re-users of the recovered waste materials. Consolidators sort and process recovered wastes and sell to local processors in bulk or to buyers abroad. Furthermore, recyclables market, particularly prices, volume and products traded, are significantly influenced by the demand from end-users of recyclable materials like processors and manufacturers which use recyclable materials as inputs. Recyclables market development, on the other hand, is a factor of available processing and manufacturing technology, local and national policies pushing for use of recyclable materials and incentives given for use of the said materials, among others.

In addition, markets can be classified by the specific types of recyclables or commodities collected. In most communities, the recyclables include waste paper, metals, glass containers, and plastics. The marketability of materials recovered from solid wastes depends, in part, on the standards of acceptability of the recycled materials markets. Examples on the acceptability of recyclable materials in the market are as follows: Most types of paper, such as old newspapers and office papers, are recyclable. Office paper is usually collected in two grades: "high grade" and "mixed." High grade paper typically consists of white copier paper, white computer paper, white office stationery, and white note paper. Mixed office paper includes nearly all waste paper generated in an office, such as white and colored paper, file folders, and manila envelopes. Because they are minimally sorted, mixed paper and old newspapers are considered to be of low quality and generally yield very low market prices.

Buyers of either type of recyclable paper usually prohibit certain contaminants, including glossy paper, tape, and envelopes with plastic windows. When paper is recovered from mixed solid waste, the quality and quantity of the recovered material are also reduced. For example, crushed glass, food waste, moisture and other debris can contaminate much of the paper. For corrugated cardboards, it is more desirable to buyers if contaminants are removed and boxes are flattened and baled.

Other materials that are recyclable are metals—aluminum and tin/steel cans, aluminum foil, and other scrap metals such as copper, which yield a high market price. Each of these materials has to comply with quality standards for acceptance in the recycled materials market.

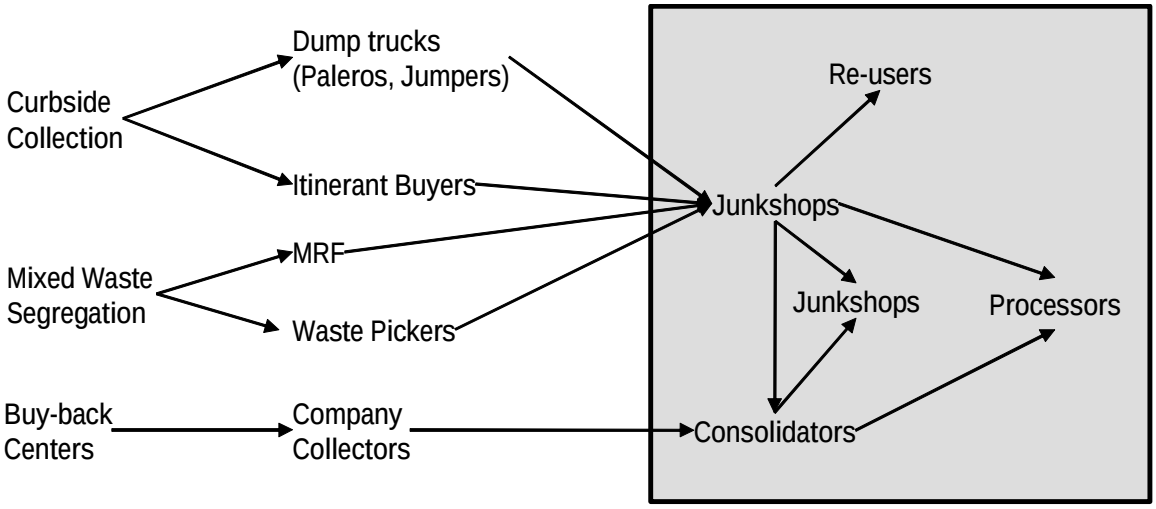

Figure 2. Scope of the Study – From Junkshops to Processors

V. THE STUDY AREAS

A. GENERAL DESCRIPTION

The study regions are Regions 9, 11, 12 and the Autonomous Region of Muslim Mindanao (ARMM). Sites selected for the study are Ipil, Pagadian City and Zamboanga City for Region 9; Davao City for Region 11; Cotabato City, General Santos City, Kidapawan City, Koronadal City and Tacurong City for Region 12; and Isabela City for ARMM. The map locations of the sites are shown in Figure 3 and the short geographic and demographic descriptions follow in the succeeding sections. With the exception of Zamboanga City, the ECOGOV Project is currently assisting the LGUs in one or all resource management areas—urban environmental management, forest resources management, and coastal resources management.

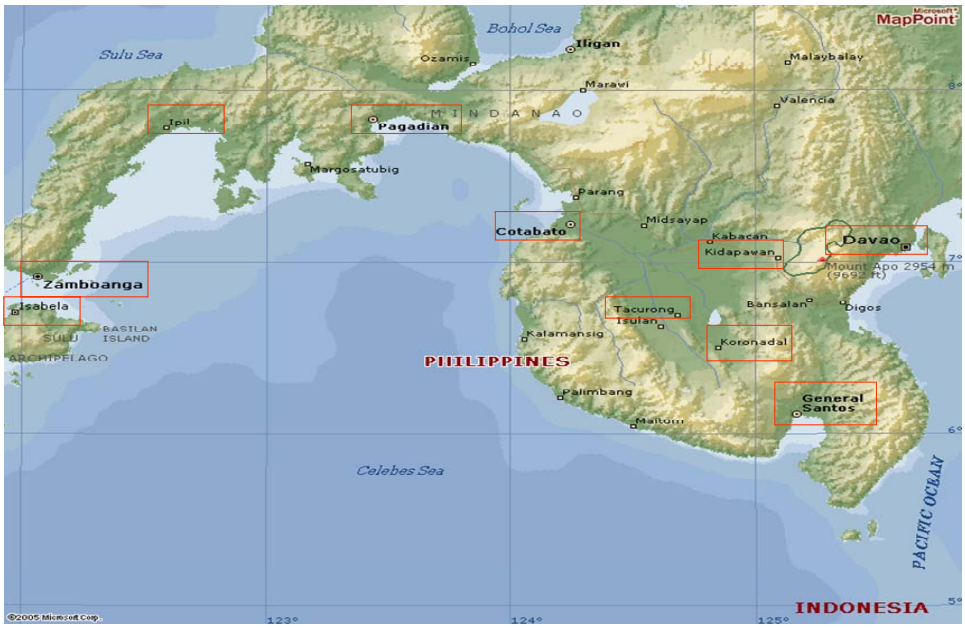

Figure 3. Location of Study Sites in Mindanao.

➢ ***Davao City***

Davao City is located at the southeastern part of Mindanao. It is bounded on the north by Davao province; on the east partly by Davao province and Davao Gulf; on the south by Davao del Sur; and on the west by Cotabato province (Figure 4). It is approximately 946 aerial km or 588 statute miles, southeast of Manila. The city has an area of 244,000 hectares, or 8 percent of the total land area of Southern Mindanao Region (Region XI). It is divided into 3 congressional districts with a total of 12 political districts, and 180 barangays. As of the 2000 census, the city's population was estimated at 1.1 million, population density was 469 persons per km^2, and the growth rate was 2.83 percent annually, which was higher than the national average of 2.36. The urban and rural areas recorded 175,761 and 64,298 households, respectively.

Because of its strategic location, Davao City is the country's trade center for Southern Mindanao and the South Pacific, as well as the southern gateway to Indonesia, Malaysia, Brunei, and Australia, among others.

- ***Cotabato City***

The city of Cotabato lies in the northwest portion of Maguindanao, a component province of the ARMM Region (see Figure 4). It is bounded on the north by the municipality of Sultan Kudarat, on the south by the municipality of Datu Odin Sinsuat, on the east by the municipality of Kabuntalan and on the west by Illana Bay. It is approximately 4–5 hours and 3 hours away via land transportation from Davao and General Santos City, respectively.

The total land area of the city is about 17, 599 hectares, which is divided politically into 37 barangays. Its population in 2000 was estimated at 163,849 persons, or 31,227 households, growing at 2.38 percent annually. The city belongs to a region with a poverty incidence of 50 percent in 1995 and 51 percent in 2000—one of the highest in the country.

- ***Kidapawan City***

Kidapawan City is at the southeastern portion of Cotabato Province, located almost midway between the cities of Davao and Cotabato at a distance of 110 and 120 km, respectively. It is bounded by the municipalities of Makilala in the south, M'lang in the southwest portion, Matalam in the northwest, and President Roxas and Magpet in the north. It is strategically located at the foot of Mount Apo Natural Park, the country's tallest peak, making the place a potential tourist destination. About 36 percent of its total land area of 34,007 hectares is within the Natural Park.

Kidapawan City has a population of 101,205 persons, or 20,241 households in 2000, which is expected to increase by 9 percent in 2008 and 20 percent in 2013. Being the capital of Cotabato province, Kidapawan City is the commercial and trading center of the seven neighboring municipalities, namely: Matalam, Roxas, Magpet, M'lang, Makilala, Arakan and Antipas.

- ***General Santos City***

The city is located in the southern part of the Philippines and Mindanao, lying 125˚1' and 125˚17' east longitude and between 5˚58' and 6˚20' north latitude. It is surrounded by the municipalities of Alabel, Maungon and Maasim of Sarangani province, and the municipalities of Polomolok and T'boli of South Cotabato. It is a center of commerce and accessible by land, air and sea through good transportation facilities and road network.

General Santos is a major exporter of canned tuna, processed fruits, particularly canned pineapple, and crude coconut oil. Among the products it imports are tin plates, tin cans, can ends, plastic cups and plastic cover, Kraftliner and semi-corrugated medium, and coated paper used in packaging processed food products.

General Santos provides full three-year exemption from business taxes for business falling within its investment priorities. None of the 10 investment priorities include processing plants for recycled materials. However, one of the program thrusts of the city is environmental regeneration.

- ***Koronadal City***

Koronadal is a component city of South Cotabato and the regional center and seat of government for the SOCCSKSARGEN Region in central Mindanao. It is located in the northeastern section of South Cotabato covering a total land area of 27,700 hectares. It is composed of 27 barangays and bounded by the municipalities of Tantangan in the northwest, Tampakan and Tupi in the

southeast, Banga in the southwest of the province of South Cotabato, and the municipality of Lutayan, Sultan Kudarat, in the northeast.

The city's population in 2000 was 133,786. The designation as the regional center in 2004 contributed to an increasing trend in population, from an annual average growth rate of 1.75 percent in 1990–1995 to an average annual growth rate of 2.63 percent. It also triggered urban growth with the population of the urban and the urbanizing barangays comprise 54 percent of the total population.

- ***Tacurong City***

Tacurong is located at the center of Central Mindanao. It is bounded by the municipalities of Lambayong (north), Isulan (west), and Pres. Quirino (east), all municipalities of the province of Sultan Kudarat. To the south of the city is Tantangan, which is part of the South Cotabato Province. It has a total land area of 15,340 hectares, administratively divided into 20 barangays and 170 puroks.

The 2000 census places Tacurong's population at 76,424, the biggest among the 12 municipalities in Sultan Kudarat. It is growing at an average of 1.9 percent annually, which is observed to be considerably lower than the reported 1990–1995 annual average growth rate of 3.8 percent. The current average annual population growth rate is also lower than Region 12's 2.1 percent.

- ***Zamboanga City***

Zamboanga City is a chartered city located on the southern part of the Zamboanga peninsula, which is at the westernmost portion of Mindanao. In the early 1900s, it used to be the governing capital of the Moro Province under the United States, encompassing the entire Mindanao and the Sulu Archipelago. As of the 2000 census, the city has a total population of 601,794 persons based on the 2000 census, residing in 99 barangays.

Zamboanga City is a busy international port strategically located on the Basilan Straight. It is bounded by the Sulu Sea to the West, the Moro Gulf, Celebes Sea and three bays (Tungawan Bay, Taguiti Bay and Malasugat Bay) to the East, the Tictabon Channel and Basilan Strait to the south, and Caldera Bay to the west. In physiography, it is bounded by the provinces of Zamboanga del Norte to the north and by Zamboanga del Sur to the east, and the Basilan Island to the south.

- ***Isabela City***

Isabela is located in the northern part of Basilan Island and is approximately 17 nautical miles south of Zamboanga City. It is bounded on the east by the town of Lamitan; on the west, by Lantawan; on the south, by Sumisip and Maluso; and on the north, by Basilan Strait which separates the island from Zamboanga Peninsula.

The city has a total land area of 22,373 hectares spread over the Basilan mainland and in the islands of Balatanay, Lampinigan, and, Malamawi. Ninety-five percent of the land area of Isabela is classified as rural. However, 50 percent of the total population reside in the urban barangays. Hence, the population density in the urban barangays is considerably higher (289 persons per hectare) than the rural population density of 14 persons per hectare.

There are two seaports in Basilan—in Lamitan and Isabela City. Isabela, however, has better transportation facilities that cater to incoming and outgoing passengers and cargo. Residents from neighboring towns prefer to go through the Isabela Port in going to Zamboanga City because of the availability of more transportation services to and from Zamboanga City.

- ***Ipil***

Ipil is the capital of Zamboanga Sibugay province and strategically located at the junction of three major highways. One highway goes northeast to Dipolog City (the capital of Zamboanga del Norte), another goes east to Pagadian City (the capital of Zamboanga del Sur), and the third goes southwest to Zamboanga City. It is approximately 135 km west of Pagadian City; 139 km east of Zamboanga City; and, 177 km south of Dipolog City. Ipil is bounded on the north by the municipality of Titay; on the south by Sibuguey Bay; on the west by the municipality of R.T. Lim and Tungawan; and on the east by the municipality of Naga. The municipality is composed of 28 barangays (Municipality of Ipil ISWM Plan, 2004). The municipality a total population of 52,481, which is growing annually at an average of 3.85 percent, based on the 1995 and 2000 population censuses.

- ***Pagadian City***

Geographically, Pagadian City is located in the Zamboanga Peninsula, specifically at 7^0 45.5' to 8^0 3' latitude and 123^0 10' to 123^0 33' longitude. It is bounded by the municipality of Sindangan (north), Midsalip (northeast), Labangan (east), Bayog, Lakewood, Tigbao and Dumalinao (west, northwest and southwest), and in the south by the Illana Bay.

Pagadian is accessible via the converging highways of Mindanao and is about 235 km southwest of Cagayan de Oro City, 80 km southwest of Ozamis City, 150 km south of Dipolog City, and 250 km northeast of Zamboanga City. It has a population of 156,047 in 2003; a figure projected using the 1995–2000 average annual growth rate.

B. SOLID WASTE MANAGEMENT PRACTICES

From the ISWM Plans prepared by LGUs, Davao City reported the highest volume of waste generation per day (97.4 tons/day), followed by Cotabato City (70 tons), Pagadian (60 tons) and Kidapawan (41.7 tons; Table 2). General Santos has no waste generation data reported so far.

Table 2. Types of Solid Wastes Generated, 2003

CITY	Unit	Total Waste	Compostable Waste	Recyclable Waste	Residual Waste	Special Waste
Davao City	tons/day	97	47	19	31	0.68
	%	*100*	*48*	*20*	*31*	*0.70*
Kidapawan	tons/day	42	27	10	4	0.63
	%	*100*	*64*	*25*	*11*	*1.51*
Cotabato City	tons/day	70	39	23	8	0.00
	%		*56*	*33*	*11*	*0.00*
General Santos	tons/day	n.d.	n.d.	n.d.	n.d.	n.d.
	%					
Koronadal	tons/day	24	13	6	6	0.24
	%	*100*	*53*	*25*	*23*	*0.99*

CITY	Unit	Total Waste	Compostable Waste	Recyclable Waste	Residual Waste	Special Waste
Tacurong	tons/day	33	18	7	7	0.50
	%	*100*	*55*	*21*	*23*	*1.52*
Zamboanga	tons/day	38	24	14	0	0.00
	%	*100*	*63*	*37*	*0*	*0.00*
Isabela	tons/day	30	21	5	4	0.29
	%	*100*	*70*	*16*	*13*	*0.94*
Ipil	tons/day	27	22	1	3	0.68
	%	*100*	*80*	*5*	*13*	*2.49*
Pagadian	tons/day	60	36	9	15	0.33
	%	*100*	*60*	*15*	*24*	*0.54*
Total	tons/day	421	246	95	78	3
	%	*100*	*58*	*23*	*18*	*0.79*
Notes: (1) Waste generation data for Davao City is for 39 barangays in 2005.						
(2) n.d. - no data						
Sources of basic data: Solid Waste Management Plans of LGUs.						

Table 2 shows that among the cities selected for the study, Zamboanga City has the highest percentage of recyclable wastes, 37 percent, vis-à-vis the total wastes generated within the LGU. This is followed by Cotabato City with 33 percent recyclable wastes and, Koronadal and Kidapawan Cities with 25 percent recyclable wastes. These LGUs have higher percentage of recyclable wastes than the average computed for LGUs across regions while Isabela City, Pagadian City and Ipil having slightly lower percentage of recyclables wastes.

Only three cities reported disaggregated data on the types of recyclables in their waste stream, namely, Zamboanga City, Cotabato City and Davao City. Table 3 shows that waste paper and plastics constitute 81–91 percent of the total recyclables. Metals, which include mostly scrap iron and steel, aluminum, tin, bronze, lead and zinc, are about 4–10 percent, while glass containers are approximately 1–2 percent of the total recyclables. The data implies that there is a very high potential for recovery and recycling of paper and plastics in the three cities mentioned in Table 2 and, perhaps, also in the other cities.

Table 3. Distribution of Recyclable Materials, by Type

Recyclable	Zamboanga City		Cotabato City		Davao City	
	Tons/day	%	Tons/day	%	Tons/day	%
Metals	0.60	4	1.83	6	4.77	10
Paper and corrugated boards	6.31	43	12.86	42	18.21	39
Plastics	7.00	48	8.79	29	22.80	49
Glass Containers	0.17	1	0.76	2		
Ceramics	0.09	1				
Leather	0.22	2				
Rubber tires	0.10	1	0.39	1		
Others	0.02	0	6.13	20	1.19	3
Total	14.51	100	30.76	100	46.97	100

The ten sites have implemented various SWM practices compliant with RA 9003 or the Ecological Solid Waste Management Law. Table 4 summarizes these practices and the local legislations passed supporting RA 9003. Among the LGUs, Pagadian[9] and Zamboanga[10] reported having converted its open dump to semi-controlled and controlled dumpsite as disposal facility. The other LGUs are said to still have open dumpsites as municipal solid waste disposal system. To implement a comprehensive SWM program, various local legislations and programs have been put in place. The local government of Pagadian passed an SWM ordinance before RA 9003 and adheres to the concept of *zero waste*. Hence, the LGU is hesitant in supporting the establishment of a sanitary landfill. The municipality of Ipil, on the other hand, passed in July 2005 Municipal Ordinance No. 6-198-2005 on ecological solid waste management and how such program will be funded. As required by RA 9003, all LGUs have created SWM Boards.

To support recycling, Davao and Kidapawan LGUs have organized scavengers, or waste pickers, to recover recyclables from the dumpsites. Davao City and Zamboanga City have programs on composting. Only three of the LGUs (Zamboanga City, Tacurong and Pagadian) reported having operational MRFs. Kidapawan, on the other hand, planned and approved in 2005 a budget of PhP1.6 million to build MRFs, composting and laboratory facilities. None of the LGUs have local legislations that provide economic incentives to promote recycling.

Table 4. SWM Practices and Ordinances of Study Sites

CITY / MUNICIPALITY	MSW Disposal System	SWM Plan	Local Ordinances ISWM	Program Supporting Recycling	LGU Office Responsible for SWM	Operational MRF
Davao City	Open dumpsite	Draft	Creation on SWM Board	Organized and controlled scavenger activity	ENRO	
Cotabato City	Open dumpsite				GSO	
Kidapawan City	Open dumpsite	Final	Adoption of the SWM Plan (2004); approval of budget for Material Recovery, Composting and Laboratory Facility (2005)	Organized and controlled scavenger activity	ENRO	
General Santos City	Open dumpsite		1996 – Creation of the SWM Council; 1997 – Comprehensive ISWM System			
Koronadal City	Open dumpsite	Final	1998 – Comprehensive SWM		GSO	
Tacurong City	Open dumpsite	final	Comprehensive ISWM System		ENRO	√
Zamboanga City	Controlled dumpsite	draft	Ordinance creating the SWM Board (1990); Garbage disposal fee (1992; 2004); Compost fees from MRFs (2002)		City Public Services office	√
Isabela City	Open dumpsite	final			GSO	

[9] Pagadian City Solid Waste Management Plan, Draft, 2005.
[10] Zamboanga City Solid Waste Management Plan, Draft, 2005.

CITY / MUNICIPALITY	MSW Disposal System	SWM Plan	Local Ordinances ISWM	Program Supporting Recycling	LGU Office Responsible for SWM	Operational MRF
Ipil	Open dumpsite	draft	ESWM and Funds Appropriation (2005)		Office of the Municipal Administrator (2005–06); MENRO (2007)	
Pagadian City	semi-controlled dump	final	ESWM Ordinance (before RA 9003)		GSO	√

In Cotabato City, key informants observed an improvement in the city's SWM activities. In the absence of an ISWM program, different sectors practice a variety of schemes to dispose their wastes (Table 5). Burning, for instance, is commonly practiced by households, schools, and hospitals (for toxic and hazardous wastes). Most sectors, however, depend on the collection and disposal services provided by the city's General Services Office (GSO).

Table 5. Common SWM Practices in Cotabato City, by Source

Source	SWM Practice
Households	▪ Wrap and throw ▪ Direct throwing ▪ Burning ▪ Burying/Throwing in vacant lots
Market & Commercial establishments	▪ Mixed garbage placed in designated pick-up points for dump truck collection ▪ Fish wastes thrown in canals ▪ Rotten fruits/vegetables left on the sidewalk ▪ Food wastes- collected; others are mixed with other garbage
Schools	▪ Wrap and throw ▪ Direct throwing of mixed garbage ▪ Burning ▪ Dumping in rivers, creeks
Offices	▪ Direct throwing ▪ Placed at pick-up points for collection by the dump truck ▪ Re-use papers
Hospitals, clinics and funeral parlors	▪ Wrap and throw ▪ Throwing in receptacles for collection ▪ Burning of toxic wastes and paper waste
Agricultural areas	▪ Burning ▪ Composting ▪ Direct throwing anywhere
Municipal wastes (public transportation terminals, parks, etc.)	▪ Collected and used as filling materials for low-lying areas

In summary, LGUs have a variety of plans to effectively manage municipal solid wastes. However, a comprehensive plan and policies to address and encourage recycling are still not in place.

VI. PROFILE OF JUNKSHOPS, CONSOLIDATORS AND PROCESSORS

A. GEOGRAPHIC LOCATION OF JUNKSHOPS, CONSOLIDATORS AND PROCESSORS

There are a total of 229 junkshops, 22 consolidators and 13 processors within the 10 sites selected for the study. Almost all consolidators have been surveyed while only 31 percent of the total number of junkshops have been included in the said survey. Only three of the processors have not been part of the survey. Table 6 shows that Davao City and General Santos City have the most number of junkshops. The number of junkshops in these two major urban centers in Mindanao is significantly higher than the other LGUs surveyed. Kidapawan City has the fewest number of junkshops but has two consolidators. It can also be inferred from the table that most of the consolidators are concentrated in Davao City. Only a few consolidators are situated in Cotabato City, General Santos City, Kidapawan City, Koronadal City and Zamboanga City. All processors are located in Davao City, except 1 which is situated in Tacurong City.

Table 6. Number of Junkshops, Consolidators and Processors in 10 Urban Centers in Mindanao.

CITY	No. of Junkshops			No. of Consolidators			No. of Processors/Re-Users		
	Identified	*Surveyed*	*% Surveyed*	*Identified*	*Surveyed*	*% Surveyed*	*Identified*	*Surveyed*	*% Surveyed*
ARMM									
Isabela City	8	5	62	0	0	0	0	0	0
Region 9									
Ipil (Municipality)	8	8	100	0	0	0	0	0	0
Pagadian City	8	7	87	0	0	0	0	0	0
Zamboanga City	23	4	17	4	4	100	0	0	0
Region 11									
Davao City	84	6	7	11	11	100	12	11	92
Region 12									
Cotabato City	17	10	59	2	1	50	0	0	0
General Santos City	61	10	16	2	2	100	0	0	0
Kidapawan City	5	5	100	2	2	100	0	0	0
Koronadal City	7	7	100	1	1	100	0	0	0
Tacurong City	8	8	100	0	0	0	1	1	100
Total	229	**70**	**31**	22	**21**	**91**	13	**12**	**92**

B. RECYCLABLE MATERIALS TRADED

Survey results show that not all recyclables are traded in the study sites. Major types of recyclables bought and sold by junkshops and consolidators within the sites are scrap metals, glass containers, plastics, paper and used lead-acid batteries. Table 7 below shows that scrap metals are the most commonly accepted recyclable materials by junkshops. Only a few junkshops are engaged in buying and selling waste paper.[11] Used lead-acid batteries are the least traded among the five major recyclable materials.

[11] Specific types of major recyclable materials are discussed in the succeeding section of the paper.

Table 7. Number of Junkshops by Type of Recyclable Materials Traded

City	No. of Junkshops	Proportion of Junkshops (Number)				
		Glass Containers	Plastics	Scrap Metals	Used Lead-Acid Batteries	Paper
ARMM						
Isabela City	5	4	5	4	4	0
Region 9						
Ipil	7	5	5	7	7	0
Pagadian City	8	8	7	8	6	0
Zamboanga City	5	3	3	4	3	1
Region 11						
Davao City	6	6	4	5	3	2
Region 12						
Cotabato City	10	3	7	9	9	2
General Santos City	9	9	8	9	7	5
Kidapawan City	5	1	2	5	3	0
Koronadal City	7	6	7	7	7	2
Tacurong City	8	8	8	8	8	1
Total	70	53	56	66	57	13
Percent	100	76	80	94	81	19

Of the total 21 consolidators surveyed within the covered regions of the study, three are exclusively buying and selling plastics (2 in Cotabato City and 1 in Davao City) while the same number of consolidators are engaged in trading scrap metals only (1 in Davao City and 2 in Zamboanga City). Only one consolidator, on the one hand, is exclusively buying and selling used lead-acid batteries. The remaining 15 consolidators, on the other hand, are involved in buying and selling all or several types of these major recyclable materials—glass containers, plastics, scrap metals, paper and used lead-batteries. Specifically, 83 percent of the total volume of recyclable materials recovered by consolidators monthly, excluding used lead-acid batteries, are metals while only 10 percent are glass containers, 4 percent plastics and 4 percent paper. (Table 8). It is interesting to note that 51 percent of the monthly total volume of recyclable materials recovered are brought to Zamboanga City consolidators while 29 percent go to General Santos City and 18 percent are recovered by consolidators in Davao City. The rest goes to Kidapawan City (1%), Koronadal City (0.5%) and Cotabato City (0.1%).

Table 8. Percentage Share of Recyclable Materials[12] Recovered by Consolidators

Recyclable Materials	Total Volume (kg/mo)	%
Metals	5,087,570	83%
Glass Containers	583,435	10%
Plastics	231,713	4%
Paper	218,530	4%
Total	**6,121,248**	**100%**

[12] Excluding used lead-acid batteries

Further, survey results show that bulk of the glass containers (59%) and plastics (54%) are consolidated in General Santos City. Davao City ranks second in purchasing these recyclable materials from junkshops, 27 percent and 26 percent of total glass containers and plastics, respectively. Zamboanga City is the major consolidator of scrap metals where 60 percent of the total scrap metals recovered are brought in bulk by consolidators situated in this city. Only 25 percent and 13 percent of the total recovered metals are consolidated in General Santos City and Davao City, respectively. The survey also highlights that Davao City consolidators receive 80 percent of the total waste paper recovered. For used lead-acid batteries, Zamboanga City, recovering 67 percent, serves as the major consolidator of used lead-acid batteries while Davao City is the second major consolidator of this recyclable material recovering 29 percent of the total volume of the used lead-acid batteries bought by consolidators surveyed.

Table 9. Distribution of Recyclable Materials Recovered by Consolidators, by LGU, by Type

LGU	Distribution of Recyclable Materials, by LGU, By Type				
	Glass Containers	Plastics	Scrap Metals	Paper	Batteries
ARMM					
Isabela City	0%	0%	0%	0%	0%
Region 9					
Ipil	0%	0%	0%	0%	0%
Pagadian City	0%	0%	0%	0%	0%
Zamboanga City	9%	4%	60%	5%	67%
Region 11					
Davao City	27%	26%	13%	81%	29%
Region 12					
Cotabato City	0%	3%	0%	0%	0%
General Santos City	59%	54%	25%	14%	2%
Kidapawan City	4%	12%	0%	0%	1%
Koronadal City	0%	1%	0%	0%	1%
Tacurong City	0%	0%	0%	0%	0%

As discussed earlier, all processors are in Davao City, except for one situated in Tacurong City. Majority of the processors in Davao City (7 out of 11) buy recyclable plastics. Four of these processors produced plastic twines and pellets while the remaining three are engaged in producing plastic household items such as plastic pails and basins, among others. Plastic cellophanes used in banana plantations, which are commonly found in Davao City, are used by processors of twines and pellets. A plastic processor is involved in manufacturing plastic corner posts, polypropylene polystraps and mouldering items. Two processors receive scrap aluminum which is turned into aluminum cooking pots and other kitchen utensils. Two paper processors in Davao City use rejected corrugated boxes and cartons to produce recycled corrugated boxes and, fruit and egg trays. In Tacurong City, a processor produced ground plastics from recyclable plastics bought and transports these ground plastics to Davao City for production of twisted twines and pellets. No glass processing is situated in any of the regions included in the study. All recyclable glass containers collected by consolidators are brought to Manila for processing. No processor for used lead-acid batteries has been found in any of the sites but a re-user in Zamboanga City repair used lead-acid batteries and re-condition these for sale with the same warranty as new ones.

The discussion above shows that only Davao City serves as the major processor of recyclable materials within the regions covered by the study, with Tacurong City having only one plastic processor. Thus, a high percentage of the recyclable materials collected by consolidators in the regions of the study is brought outside Mindanao, in Manila, Caloocan City, Iligan City, Cebu City and abroad. Processing activities are limited to producing those items mentioned.

Table 10. Recyclable Materials Processed and Products Produced, Davao City and Tacurong City

No. of Processors	Recyclable Materials Used	Recycled Products
4	HIPS plastic cups; PE transparent/sando bags; PET plastic bottles; PVC tubes and bottles; hard plastics used in toys, household appliances, etc.; blue and white plastics used in banana plantations	Twisted twines and pellets
2	All types of plastics	Plastic pails, basins, etc.
1	All types of plastics	Plastic corner posts, polypropylene polystraps, mouldering items
2	Scrap aluminum	Aluminum cooking pots and other kitchen utensils
1	Rejected corrugated boxes	Recycled corrugated boxes
1	Cartons	Egg trays
1	All types of plastics	Grounded plastics

C. SOURCING OF RECYCLABLE MATERIALS

Table 11 shows that all cities, except Cotabato City, source recyclable materials within and from surrounding municipalities. Davao Cities, for example, receive materials from the cities of Kidapawan, Cotabato, General Santos, Koronadal, Zamboanga, and neighboring municipalities. The recyclable materials recovered are processed in the City (e.g., plastics and aluminum), brought to Manila or exported.

There are several cities that appear to be centers of trading in recyclable. In Western Mindanao, the town of Ipil appears to be the center for trading recyclable for Sibugay province. Isabela City receives recyclables from neighboring islands and municipalities of Basilan. Zamboanga del Sur municipalities bring their materials to Pagadian City, which are then transported to other destinations—Zamboanga City, Davao City, Ozamis, and Cagayan de Oro City, among others. Zamboanga City, however, appears to be the center of recyclables trading for Western Mindanao and receives materials from Sulu, Bongao, Basilan province (including Isabela City), Ipil, Pagadian, and surrounding municipalities.

In Southern Mindanao, two cities—Davao City and General Santos—are the major destinations of recovered recyclable materials. Table 7 further shows that the cities of Cotabato, General Santos, Kidapawan, Koronadal, and even Pagadian and Zamboanga in Western Mindanao, bring certain types of recyclables to General Santos and Davao City. General Santos receives materials from Cotabato, Kidapawan, Koronadal and Tacurong, and brings these materials to Davao, Manila, Cebu, Polomolok, and to countries like Singapore and China.

Among the 10 urban areas, only Cotabato City receives materials from one other area—Davao City. This is primarily due to the presence of a Shioktong bottle re-user.

Table 11. Sources and Markets for Recyclable Materials in the Study Sites

CITY	Source of Recyclables Outside the Municipality/City	Location of Market for Recyclables
Cotabato City	Davao City	Cotabato City, Davao, General Santos City, Manila
Davao City	Kidapawan City, Cotabato City, General Santos City, Koronadal City, Zamboanga City, Pagadian City, and neighboring municipalities	Davao City, Manila, other countries
General Santos City	Kidapawan City, Cotabato City, Koronadal City, Tacurong City	General Santos City, Manila, Zamboanga City, Davao City, Cebu, Polomolok, Glamang, other countries
Ipil	Surrounding Sibugay municipalities	Cagayan de Oro City, Zamboanga City, Dipolog City, Oroquieta City, Misamis Occidental, Cebu
Isabela City	Lamitan, Maluso, Sumisip, surrounding small islands, and other highland municipalities within Basilan	Zamboanga City, Manila
Kidapawan City	Matalam, Makilala, Bansalan, Digos, General Santos City, Davao City, and neighboring municipalities	Kidapawan City, Davao City, General Santos City, Tacurong City
Koronadal City	Tacurong City	Koronadal City, General Santos City, Davao City, Tacurong City, South Cotabato, Cebu , Cotabato City
Pagadian City	Ipil and neighboring Zamboanga del Sur Municipalities	Zamboanga City, Davao City, Cagayan de Oro City, Ozamis, NSC, Molave ZDS
Tacurong City	For Enriquez Recycling Center Koronadal City, Davao City, Cotabato City, General Santos City, Kidapawan City, Polomolok	Koronadal, Caloocan, General Santos City
Zamboanga City	Ipil, Pagadian City, Isabela City, Basilan Province, Sulu, Bongao, and other surrounding municipalities/cities	Zamboanga City, Metro Manila, Cebu, Davao City and Singapore

VII. RECYCLABLE SCRAP METALS MARKET

A. TYPES OF SCRAP METALS TRADED

Scrap metals are categorized into two: ferrous and non-ferrous[13]. Scrap iron and steel are ferrous scrap metals while non-ferrous scrap metals include all other metals other than iron and steel, including aluminum, copper, lead, zinc, nickel, titanium, cobalt, chromium and precious metals. The former, ferrous scrap metals, are the most traded of all the scrap metals that include old automobiles, farm equipment, household appliances, steel beams, railroad tracks, ships, food packaging and other containers. Non-ferrous scrap metals, on the other hand, are those from beverage packaging, radiators and catalytic converters from old automobiles, electrical boards from old computers, old pipes from buildings and spent photographic films. Examples of commonly recycled scrap metals are aeronautical and aerospace equipment, including airplanes and rockets; aluminum siding, doors and window frames; appliances, automobiles; bed frames and mattress springs; bicycles; bridges; cast iron sinks and bathtubs; computers; cooking pots and pans; electrical wire; elevators; eyeglass frames; farm equipment; food and beverage containers; hospital equipment; industrial cuttings; industrial machinery; locks and doorknobs; office equipment and furniture; park and playground equipment; pipes; railroad and subway cars; roadbed reinforcing bars; roofing; ships; structural steel building frames; telephone wires; tools and toys.

In the regions studied, scrap metals traded are iron, steel, aluminum, bronze, lead and zinc. Within the regions, scrap iron and steel are referred to as scrap metals while non-ferrous metals such as bronze, lead and zinc are locally called alloys. Most of the scrap metals traded are scrap iron and steel. Specifically, non-ferrous scrap metal items bought and sold are light aluminum-made materials like pots and basins, aluminum cans for soft drinks, hard aluminum products, aluminum jalousies, GI sheets, bottled soft drink covers (*tanzans*), tin cans, stainless items such as kitchen utensils, brass (*tanso dilaw*/bronze) and copper (*tanso pula*)—made materials, vehicle fender (*tapalodo*), washer/lead (*tingga*) and zinc.

B. VOLUME OF SCRAP METALS TRADED

At the junkshop level, Davao City, General Santos City, Ipil and Pagadian City report trading an average of 10 tons to 20 tons of metals per month (Table 12). Zamboanga City recovers the largest average volume of scrap metals while General Santos City ranks second in consolidation of these recyclable materials. This indicates that these two cities are major trading centers of metals. Comparing the volume recovered by junkshops to that of consolidators, the figures show that the surveyed junkshops supply only about 14 percent of the total volume of required scrap metals by consolidators. The bulk of the scrap metals (more than 80 percent) bought by consolidators could come from other junkshops not surveyed (especially true for Davao City, General Santos City and Zamboanga City from which the study only interviewed about 10 percent of the total junkshop population) and from other municipalities, as indicated by the supply chain discussed in the next section.

[13] Internal Revenue Service of the Department of Treasury, U.S.A. Scrap Metal Industry

Table 12. Volume of Recovered Scrap Metals by Junkshops and Consolidators, by Site, 2005

City	JUNKSHOPS			CONSOLIDATORS		
	No.	Total (kg/mo)	Average (kg/mo)	No.	Total (kg/mo)	Average (kg/mo)
Cotabato City	9	80,400	8,933	1		
Davao City	5	93,770	18,754	11	686,250	62,386
General Santos City	9	96,515	10,724	4	1,291,500	322,875
Ipil	7	98,500	14,071			
Isabela City	4	42,000	10,500			
Kidapawan City	5	24,840	4,968	2	14,060	7,030
Koronadal City	7	20,408	2,915	1	23,760	23,760
Pagadian City	8	163,000	20,375			
Tacurong City	8	67,590	8,449			
Zamboanga City	4	13,500	3,375	4	3,072,000	768,000
TOTAL	**66**	**700,523**	**10,614**	**23**	**5,087,570**	**221,199**

C. PRICES OF SCRAP METALS

Table 13 shows the minimum, maximum and average buying and selling prices of recovered metals in the 10 survey sites. On the average, the buying price of scrap iron, a type of scrap metal most commonly-traded other than scrap steel, is about PhP6.94 per kg, while the selling price is PhP8.92 per kg, or a mark-up of approximately 28.5 percent. The average buying and selling prices for all scrap metals are PhP35.10 and PhP44.28 per kg, respectively, with a mark-up of about 26 percent.

Table 13. Junkshop Prices of Scrap Metals in the Study Sites

TYPES OF METALS	BUYING PRICE (P/kg)			SELLING PRICE (P/kg)		
	Minimum	Maximum	Average	Minimum	Maximum	Average
AVERAGE	**15.42**	**67.08**	**35.10**	**23.29**	**61.50**	**44.28**
Aluminum Cooking Pot	14.00	50.00	35.75	7.50	72.00	44.32
Aluminum Beverage Cans (soft drinks)	7.00	50.00	29.70	25.00	50.00	41.94
Hard Aluminum	20.00	60.00	44.00	30.00	80.00	57.47
Aluminum Jalousies	20.00	130.00	47.25	30.00	80.00	55.67
Scrap Iron	1.50	11.00	6.94	3.00	14.00	8.92
Cans (tansan, tin cans)	1.00	15.00	5.68	2.00	20.00	10.39
Stainless	20.00	140.00	39.40	5.00	70.00	47.38
Brass (tanso dilaw)	25.00	140.00	57.90	50.00	100.00	75.33
Copper (tanso pula)	70.00	155.00	114.50	110.00	181.00	143.88
Vehicle Fender (tapalodo)	1.00	9.00	5.67	3.00	11.00	10.79
Washer/Lead (Tingga)	3.00	15.00	10.70	8.00	25.00	17.80
Zinc	3.00	15.00	8.67	6.00	35.00	17.48
Others (Bronze, Alloy)	15.00	15.00	15.00			

Aluminum pots/utensils and used beverage cans (UBCs) are also commonly traded. The buying prices for used aluminum pots/utensils and UBCs average approximately PhP35.75 per kg and PhP29.70 per kg, respectively, while the selling prices are PhP44.32 per kg for aluminum pots and PhP41.32 for UBC.

In US dollars, at PhP 55 per dollar, the buying and selling prices would be approximately $0.65 per kg and $0.81 per kg, respectively, for aluminum pots, and $0.54 and $0.75, respectively, for UBC. There is not much difference in the domestic price of scrap aluminum utensils ($0.81 per kg) and the internationally listed spot market price of $0.99 per kg. For UBC, however, the international spot market price in December 2005 is $1.72 per kg, which is about 129 percent higher than the domestic price. The interviewed consolidators in the 10 sites did not indicate exportation of UBC. This could mean that (a) recovered UBC may still be way below the local demand of processors; (b) the local suppliers (consolidators) have not yet developed their international market; or (c) local supply of UBC could not meet the required volume of international buyers.

For scrap iron and steel, the internationally listed spot market price of $156 per ton is much lower than the average domestic (junkshop) selling price of $162 pet ton. This could only imply that the demand for scrap iron and steel in the two importing countries (China and Singapore) mentioned is so high that they offer higher than the average international spot market prices to attract more suppliers.

D. MARKET FLOW FOR SCRAP METALS

There are four consolidation nodes for scrap metals: Zamboanga City which receives scrap metals from the ARMM City, Isabela City; Region 10 Cagayan de Oro City where recyclable scrap metals collected in Region 9, Ipil and Pagadian City, are brought; General Santos City where scrap metals from Region 12 urban centers, Cotabato City, Kidapawan City, Koronadal City and Tacurong City, are consolidated; and Davao City which is the receiving point of scrap metals collected within the city and Cotabato City.

Scrap iron and steel from Isabela City and consolidated in Zamboanga City are brought for processing and/or re-consolidation in Metro Manila. A percentage of these is also exported to China. Recovered scrap iron and steel from Ipil and Pagadian, on the other hand, are bought by a middle person or trader to Cagayan de Oro City. From Cagayan de Oro, the scrap iron and steel are brought to Iligan City where the National Steel Corporation is stock piling scrap iron and steel while the scrap aluminum are shipped to Cebu. Scrap aluminum recovered by the consolidators in General Santos City are sold to a Cebu-based processor, while the scrap iron are exported. Scrap aluminum recovered by consolidators in Davao City are processed into aluminum pots and other kitchen utensils while scrap iron is exported to China and Singapore. Thus, the only processing activity in all of the regions covered by the study is the manufacture of aluminum pots and other kitchen utensils in Davao City. The rest of the recovered scrap metals by consolidators are processed in Iligan City, Manila and Cebu City.

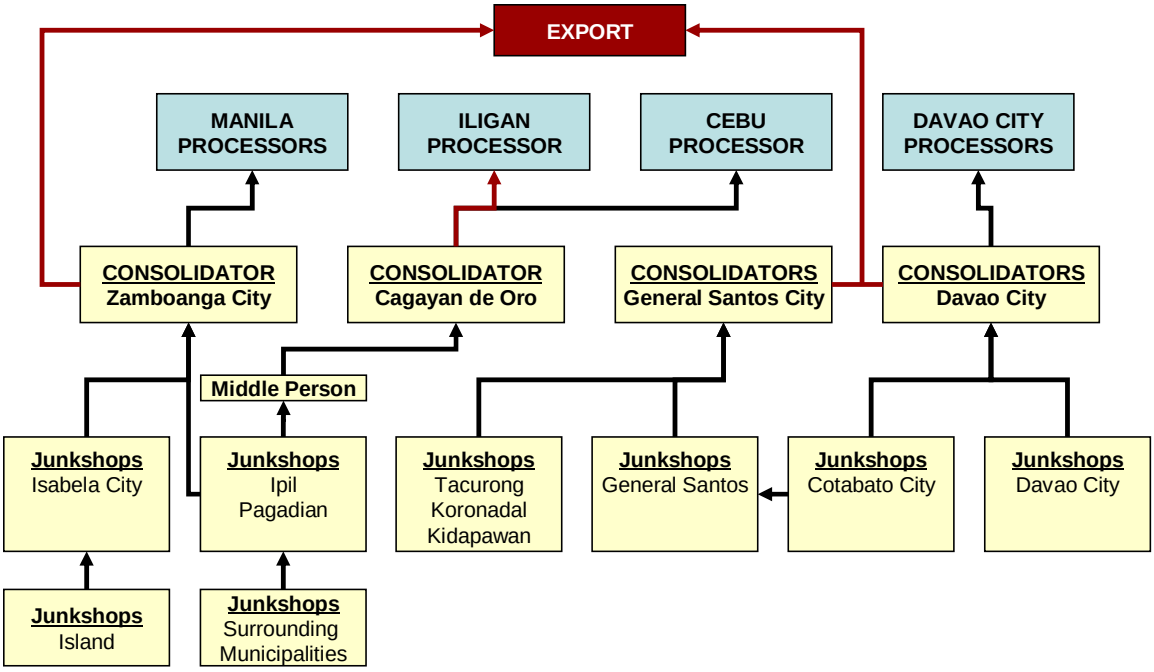

Figure 4. Market Flow of Recyclable Scrap Metals in the Study Sites

E. QUALITY REQUIREMENTS OF SCRAP METALS RECYCLING

There is not much contamination problem with respect to scrap-steel recycling. Commingled aluminum provide a small boost to the steel-making furnace, while a little amount of mixed tin creates too little furnace problems.

Worldwide, perhaps the most successful recyclable is aluminum UBCs. However, there are a number of contamination problems that can render the recycling process difficult. Contaminants include dirt, moisture, plastic, non-container aluminum, and other metals. Moisture concentrated in furnace during the melting process can cause steam explosion.

VIII. THE RECYCLABLE GLASS CONTAINERS MARKET

A. TYPES OF GLASS CONTAINERS TRADED

Glass containers traded are generally classified into glass containers bought in whole and broken glass (DENR-ADB, 2003). Glass containers traded in the regions covered by the study are whole glass containers, including soft drinks and liquor bottles, soy sauce, vinegar, coffee, condiments, seasoning and juice containers. Specifically, beer bottles, soft drink bottles, ketchup bottles, "lapad," or flat-bodied liquor bottles, and "long neck" liquor bottles are the most commonly traded. In certain cities, medicine bottles are also bought, although not commonly traded.

Only one recycler surveyed reported buying broken glass containers. However, the recycler did not indicate where the materials are sold. The reason why most junkshops do not accept broken glass containers is the very strict raw material specification in glass recycling in terms of color and contaminant materials (other types of glass and ceramics). Material contamination affects the quality of the finished product and life of the furnace. For instance, mixing of colors (clear, green and brown) affect the final color of the product, while ceramics, which has a different burning temperature requirement, affect the life of the furnace. Hence, additional cost is incurred by the recycler in segregating broken glasses by color and removing the contaminant materials.

B. VOLUME OF GLASS CONTAINERS TRADED

In 2005, the junkshops and consolidators in the study sites were able to recover more than 4 million pieces of glass containers per month, or approximately 56 million pieces in one year (Table 14). Table 14 shows that junkshops in General Santos City recover the largest volume of glass containers at an average of 80,192 pcs. or 20,048 kg per junkshop per month.[14] Table 14 further shows that Cotabato City junkshops also recover a large volume of bottles, i.e., an average of 52,800 pcs. per junkshop in a month. This is primarily due to the presence of a Shioktong bottle re-user in the city. Zamboanga City, on the other hand, has the third highest average volume recovered per junkshop.

At the consolidator level, data show that General Santos City, receiving 59 percent of the total glass containers consolidated, is a major market for glass containers in southern and central Mindanao. Davao City ranks second as it receives 27 percent of the total volume of glass containers consolidated. Zamboanga City receives only 9 percent of the total volume of glass containers at the consolidator level.

[14] The assumed weight of 0.25 kg per bottle is based on the average weight of the largest volume of traded bottles, i.e., clear soy sauce bottles and "lapad" or flat, clear whiskey/brandy bottles. The average weight was determined by weighing samples of these types of bottles.

Table 14. Recovered Glass Containers by Junkshops and Consolidators in the Study Sites, 2005.

City	JUNKSHOPS					CONSOLIDATORS				
	No.	Total (pc/mo)	Total (kg/mo)	Average (pc/mo)	Average (kg/mo)	No.	Total (pc/mo)	Total (kg/mo)	Average (pc/mo)	Average (kg/mo)
Cotabato City	3	158,400	39,600	52,800	13,200	1				
Davao City	6	44,640	11,160	7,440	1,860	11	625,600	156,400	56,873	14,218
General Santos City	9	721,724	180,431	80,190	20,048	4	1,384,800	346,200	346,200	86,550
Ipil	5	143,160	35,790	28,632	7,158					
Isabela City	4	39,920	9,980	9,980	2,495					
Kidapawan City	1	19,708	4,927	19,708	4,927	2	104,640	26,160	52,320	13,080
Koronadal City	6	18,135	4,534	3,023	756	1	3,600	900	3,600	900
Pagadian City	8	246,238	61,560	30,780	7,695					
Tacurong City	8	213,020	53,255	26,628	6,657					
Zamboanga City	3	119,250	29,813	39,750	9,938	4	215,100	53,775	53,775	13,444
TOTAL	**53**	**1,724,195**	**431,049**	**32,532**	**8,133**	**23**	**2,333,740**	**583,435**	**101,467**	**25,367**

C. PRICES OF GLASS CONTAINERS

Glass containers at the junkshop and consolidator level are priced by piece, not by weight. In 2005, the junkshops in all 10 sites reported a PhP 0.91 average buying price of glass containers and an average selling price of PhP 1.58—a mark-up of about 74 percent to cover for costs as well as profit and risk margin (Table 15). The survey data show that beer and soft drink bottles, clear Sunny Orange bottles, and clear coffee glass containers are among the recyclable glass containers that command higher buying and selling prices. For soft drink bottles, there is already an existing market with the soft drink companies, which has a deposit-refund system in place.

Assuming an average weight of 0.25 kg per bottle, the average buying price for recyclable glass containers would be approximately P3,640 per ton, or US$66 per ton. This price is higher than the December 2005 world market spot price for scrap post-consumer glass containers and clear glass containers of US$6.00 per ton and US$24 per ton, respectively. The high domestic price of glass containers could explain the absence of exporters among the surveyed consolidators. It could also imply that the local demand is higher than the supply of recovered glass, hence, the high domestic price.

Table 15. Junkshop Prices of Recyclable Glass Containers, as of October 2005

Type of Glass Containers	Buying Price (P/pc)			Selling Price (P/pc)		
	Minimum	Maximum	Average	Minimum	Maximum	Average
AVERAGE (Per Piece)	**0.34**	**1.68**	**0.91**	**0.85**	**2.09**	**1.58**
Beer Bottle (Grande)	1.00	3.00	2.23	1.65	5.00	3.33
Beer Bottle (Regular)	0.25	0.89	0.70	0.90	3.00	1.50
Ketchup Bottle	0.15	0.40	0.23	0.30	1.00	0.55
Jars (big/small)	0.25	2.00	0.81	0.40	2.15	1.28
Medicine Bottle	0.15	1.00	0.38	0.25	1.00	0.68
Gilbey's Bottle	0.10	1.00	0.46	0.20	2.00	0.82
Soy Sauce Bottle (Clear)	0.10	0.75	0.42	0.30	0.80	0.59
Soy Sauce (Colored)	0.30	0.40	0.33	0.65	0.75	0.70
Gin Bottle (Bilog)	0.25	1.00	0.45	0.30	0.80	0.69

Type of Glass Containers	Buying Price (P/pc)			Selling Price (P/pc)		
	Minimum	Maximum	Average	Minimum	Maximum	Average
"Lapad" Bottle	0.25	0.75	0.50	0.30	1.00	0.72
Litro Soft drinks	1.50	4.00	3.14	3.00	5.00	4.05
Long Neck Liquor Bottle	0.10	1.10	0.66	0.65	1.50	0.93
Coffee Glass	0.25	4.00	1.09	0.50	4.50	2.08
Juice Bottle (Gatorade, iced tea)	0.25	1.50	0.81	2.50	2.50	2.50
Soft drinks Bottle (regular)	0.25	1.50	0.82	0.85	1.80	1.26
Sunny Orange Bottle (big/small)	0.25	4.00	1.03	0.40	4.00	1.43
Wine Bottle	0.25	1.50	1.00	2.00	2.00	2.00
Shioktong	0.30	1.50	0.93	0.60	1.60	5.20
Lime/Viagro	0.50	0.50	0.25	0.60	0.60	0.60
Efficascent Oil	0.25	0.70	0.48	0.70	0.75	0.73
Broken Glass	0.50	0.50	0.50			

D. MARKET FLOW FOR GLASS CONTAINERS

The interview results in almost all cities show that that there exists a local demand for clean glass containers by local vinegar, cooking oil and soy sauce re-packers and manufacturers. The majority of the recovered glass containers, however, are sold to Metro Manila re-users and glass container manufacturers.

The survey revealed that there are no glass processors in any of the study sites, although there is one re-user of Shioktong bottle in Cotabato City (Figure 5). As mentioned in the earlier discussion, bulk of the recovered glass containers in Southern Mindanao are consolidated in General Santos City and Davao City while glass containers recovered in Western Mindanao are brought to Zamboanga City. These consolidated glass containers are directly shipped to Manila for processing. This implies that consolidation of large volume of glass containers happen in General Santos City and Davao City where the biggest port facilities are found. This has bearing on reduction of transportation costs.

It is interesting to note that Cebu has one glass recycler listed in the Solid Waste Association of the Philippines (SWAPP) directory. San Miguel Corporation also has a glass bottle processing plant in Mandaue City. This explains why some of the recovered glass containers from Koronadal City are shipped to Cebu.

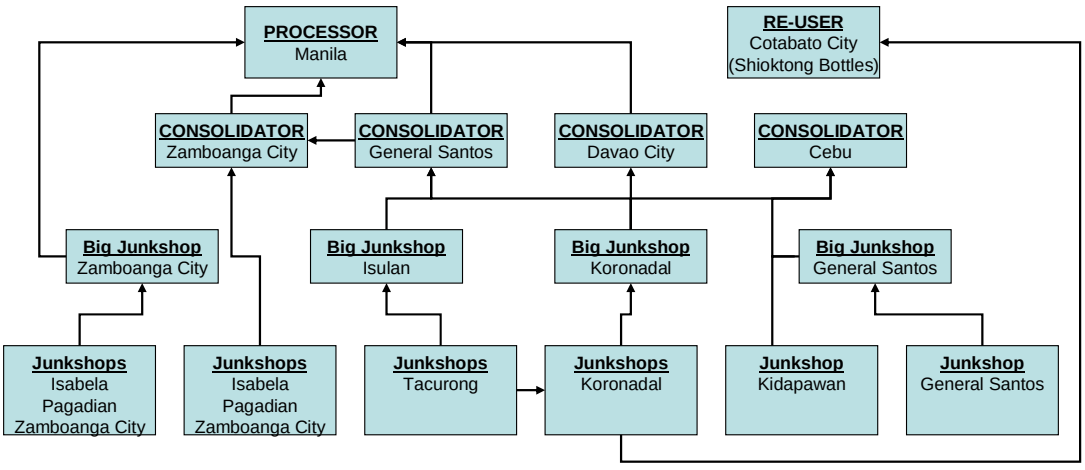

Figure 5. Market Flow of Recyclable Glass Containers in Mindanao

E. QUALITY REQUIREMENTS OF GLASS RECYCLING

Glass recycling has very strict material specifications, partly explaining why broken glass trading is not common. These specifications include separation of non-container and container glasses, color sorting, and removal of contaminant materials. Non-container and container glasses are chemically different, and therefore, are not be mixed. Thus, it is a must to ensure that the ones collected are glass containers, a bottle or a jar. Examples of these are iced tea and soft drink bottles, food jars, beer bottles, wine and liquor bottles, and juice and water containers. These must be separated from non-container glass and metals such as ceramic coffee cups, drinking glasses, mirrors, heat resistant ovenware (Pyrex or Visionware) and light bulbs. Also, glass containers should be free from metal caps, lids or neck rings, or ceramic and wire caps from beer bottles. Other contaminants include ceramic plates and pottery, clay garden pots, laboratory glass, windshields and window glasses, stone and dirt, and hazardous glass containers.[15]

Glass containers, too, should be separated by color—clear, amber or green. It should be noted that color separation must be done during the collection period. Otherwise, this should be at the early stage of the recycling process.

Most often, broken glass that do not meet standard specifications is used as abrasives (finely ground container and non-container glass used in sand blasting), aggregate substitute (container and non-container glass used in concrete, road beds, pavement and parking lots as well as drainage medium, backfill or landscaping purposes), bead manufacturing (container and non-container glass melted into rounded glass pellets or beads and used in reflective paint for highways as well as in peening and cleaning metals), decorative applications (ceramic tiles, picture frames, costume jewelry and some household items that include recycled container and non-container glass) and fiber glass.

[15] http://www.gpi.org/recycling/faq/

IX. THE RECYCLABLE PLASTICS MARKET

A. TYPES OF PLASTICS TRADED

Recyclable plastics are classified by resin type. Table 16 below shows description of resin types, packaging applications or in which products these types of plastics are used, and recycled products from these types of plastics.

Table 16. Plastic Resin Types, Packaging Applications and Recycled Products[16]

Resin Type Description	Packaging Applications	Recycled Products
POLYETHYLENE TEREPHTHALATE (PET, PETE) ▪ Clear, tough and has good gas and moisture barrier properties ▪ Commonly used in soft drink bottles and many injection molded consumer product containers ▪ Nickname: Polyester	- Plastic soft drinks, mineral water, sports drink, beer, mouthwash, catsup and salad dressing bottles - Peanut butter, jelly and jam jars - Oven-proof film and oven-proof prepared food trays	- Fiber, tote bags, clothing, film and sheet, food and beverage containers, carpet, strapping, fleece wear, luggage and bottles
HIGH DENSITY POLYETHYLENE (HDPE) ▪ Used to make bottles for milk, juice, water and laundry products ▪ Unpigmented bottles are translucent, have good barrier properties and stiffness ▪ Well-suited for packaging products with a short shelf life such as milk ▪ Often used for packaging many household and industrial chemicals such as detergents and bleach	- Milk, water, juice, cosmetic, shampoo, dish and laundry detergent bottles - Yogurt and margarine tubs - Cereal box liners - Grocery, trash and retail bags	- Liquid laundry detergent, shampoo, conditioner and motor oil bottles - Pipe, buckets, crates, flower pots, garden edging, film and sheet, recycling bins, benches, dog houses, plastic lumber, floor tiles, picnic tables, fencing
VINYL (POLYVINYL CHLORIDE OR PVC) ▪ Has excellent chemical resistance, good weatherability, flow characteristics and stable electrical properties	- Clear food and non-food packaging, medical tubing, wire and cable insulation, film and sheet - Construction products such as pipes, fittings, siding, floor tiles, carpet backing and window frames	- Packaging, loose-leaf binders, decking, paneling, gutters, mud flaps, film and sheet, floor tiles and mats, resilient flooring, cassette trays, electrical boxes, cables, traffic cones, garden hose, mobile home skirting
LOW DENSITY POLYETHYLENE (LDPE) ▪ Used predominantly in film applications due to its toughness, flexibility and relative transparency; popular for use in applications where heat sealing is necessary ▪ Used to manufacture some flexible lids and bottles, wire and cable applications	- Dry cleaning, bread and frozen food bags, squeezable bottles for honey, mustard, etc.	- Shipping envelopes, garbage can liners, floor tile, furniture, film and sheet, compost bins, paneling, trash cans, landscape timber, lumber

[16] http://www.americanplasticscouncil.org/s_apc/sec.asp?TRACKID=&CID=313&DID=931 and http://cptech.dost.gov.ph/BATBEPProfilePlasticsRecycle.php

Resin Type Description	Packaging Applications	Recycled Products
POLYPROPYLENE (PP) ▪ Has good chemical resistance, is strong and has a high melting point making it good for hot-fill liquids ▪ Found in flexible and rigid packaging to fibers and large molded parts for automotive and consumer products	- Catsup bottles, yogurt containers and margarine tubs, medicine bottles	- Automobile battery cases, signal lights, battery cables, brooms, brushes, ice scrapers, oil funnels, bicycle racks, rakes, bins, pallets, sheeting, trays
POLYSTYRENE (PS) ▪ Versatile plastic that can be rigid or foamed ▪ General purpose polystyrene is clear, hard and brittle ▪ Has relatively low melting point	- Compact disc jackets, food service applications, grocery store meat trays, egg cartons, aspirin bottles, cups, plates, cutlery	- Thermometers, light switch plates, thermal insulation, egg cartons, vents, desk trays, rulers, license plate frames, foam packing, foam plates, cups, utensils
HIGH IMPACT POLYSTYRENE (HIPS) ▪ Hard, rigid, translucent polystyrene used in quality durable products	- Household appliances, cases, boxes, and calculators, computer housings, refrigerator linings, bathroom cabinets, toilet seats and tanks, instrument control knobs, vending cups	
OTHERS ▪ Resin other than the six listed above or is made of more than one resin (listed above) and used in a multi-layer combination, e.g., nylon, ABS copolymers and polymethyl methacrylate	- 3 and 5 gallon reusable water bottles, some citrus juice and catsup bottles	- Bottles, plastic lumber applications

Most types of plastics are traded in study sites. Specifically, plastics traded are HIPS plastic cups, HDPE transparent/sando bags, PET plastic bottles, PVC tubes and bottles and items made of hard plastic, i.e., HIPS. For plastic films, which are usually made of low density polyethylene (LDPE), the requirements are stringent in that the recovered materials need to be clean and free of contaminants. Plastic films are thin-gauge plastic packaging medium used as bag or wrap. Examples include plastic grocery bags, trash bags, dry cleaner garment bags, and plastic wrap such as stretch wrap.

B. VOLUME OF PLASTICS TRADED

The 56 junkshops surveyed buy and sell a total of about 108,797 kg per month, or an average of 1,943 kg per month per junkshop (Table 17). At the junkshop level in Southern Mindanao, General Santos City accounts for 25 percent of the total volume of plastics collected. Tacurong City ranks second in plastic recovery at this level whose plastic collection is 14 percent of the total volume of plastics recovered at the junkshop level of the study sites. In Western Mindanao, junkshops in Zamboanga City and Isabela City collect bulk of the recyclable plastics accounting for 23 percent and 16 percent of the total volume, respectively.

The 23 consolidators trade a total of 231,713 kg or an average of 10,074 kg per month each. At the consolidator level, 54 percent of plastics recovered is consolidated in General Santos City. A

large percentage, 26 percent, of plastics is also brought for consolidation in Davao City while 12 percent goes to Kidapawan City.

Table 17. Recovery of Plastics by Junkshops and Consolidators

City	JUNKSHOPS			CONSOLIDATORS		
	No.	Total (kg/mo)	Average (kg/mo)	No.	Total (kg/mo)	Average (kg/mo)
Cotabato City	7	9,142	1,306	1	6,000	6,000
Davao City	4	2,830	708	11	59,833	5,439
General Santos City	8	27,360	3,420	4	125,280	31,320
Ipil	5	275	55			
Isabela City	5	17,500	3,500			
Kidapawan City	2	950	475	2	27,600	13,800
Koronadal City	7	8,110	1159	1	3,000	3000
Pagadian City	7	2,250	321			
Tacurong City	8	15,380	1,923			
Zamboanga City	3	25,000	8,333	4	10,000	2,500
TOTAL	**56**	**108,797**	**1,943**	**23**	**231,713**	**10,074**

At the processor level, five plastic processors are located in Davao City and one is in Tacurong City. Approximately 1.5 tons to 10 tons of recovered plastics (HIPS, PET, PE and HDPE) per month are processed by Davao City processors. The recovered materials are made into plastic twines and pellets. This volume, however, is below the maximum capacity of the plants. One processor reported that it can only be supplied 20 percent of its daily requirement of one ton per day, while another can only get at most 70 percent of the required volume. The gap in the processors requirement indicates that there is room to improve the recovery (supply side) of post-consumer plastics in Mindanao. However, if all recovered plastics, except PVC, in Southern and Mindanao were brought to the Davao processors, then the volume requirements of the processors could be met. The question, therefore, is how competitive are the prices of the local processors compared to the prices pf those in Metro Manila and abroad.

C. PRICES OF RECYCLABLE PLASTICS

Among the types of plastics traded in the survey sites, PET plastic bottles command the highest average buying and selling prices of PhP 8.32 per kg and PhP11.50 per kg, respectively (Table 18). The difference in the buying and selling prices for PET is approximately 32 percent. For all types of plastics, the mark-up is about the same, 31.5 percent, which is lower than the estimated mark-up in the selling price of glass containers. The world spot prices of PET in December 2005 is US$0.77 per kg for baled clear PET and US$1.14 per kg for reground PET, which are more than 200 percent higher than the domestic prices. The large difference in the international and domestic prices provides the incentive to export recovered plastics from Mindanao.

Table 18. Junkshop Prices of Recyclable Plastics in the Survey Sites

Type of Plastic	BUYING PRICE (P/kg)			SELLING PRICE (P/kg)		
	Minimum	Maximum	Average	Minimum	Maximum	Average
AVERAGE	**1.84**	**12.40**	**7.10**	**3.25**	**14.75**	**9.34**
HIPS Plastic Cups (#6)	0.30	11.00	5.13	0.50	18.00	8.88
PE (Transparent / sando bags)	1.00	10.00	4.71	1.50	12.50	7.08
PET Plastic Bottle (#1)	1.50	11.00	8.32	2.50	20.00	11.50
PVC (*tubo / bote*)	0.75	12.00	5.14	2.50	13.00	9.10
Hard Plastic (*Sibakin*)	1.50	12.00	6.21	2.50	15.00	9.47
Others (MIXED)	6.00	6.00	6.00	10.00	10.00	10.00

D. MARKET FLOW OF PLASTICS

The final destinations of recovered plastics from junkshops in the 10 sites are processors in Manila, Davao City and abroad (Figure 7). The ground plastics produced by a processor in Tacurong City are brought to Davao City for the production of plastic twines and pellets. Junkshops in Ipil and Pagadian City sell their recovered plastic materials to a middle person or a dealer who then brings the recovered materials to Cagayan de Oro City. On the other hand, the junkshops in Zamboanga City and Isabela City sell to a big junkshop that ships the recovered plastics to Manila and Davao City processors.

Figure 6 further shows that junkshops in Davao City and Kidapawan City bring their recovered materials to processors in Davao City. Those in Koronadal City and General Santos City bring their materials to Metro Manila and Davao City. One consolidator in General Santos City exports recovered plastics. Note that Koronadal City and Tacurong City junkshops trade with each other, and bring their recovered materials to a Tacurong City-based processor and to big junkshops in South Cotabato and Davao City. What is not clear from the survey data is the final destination of the materials bought by the big junkshop in South Cotabato.

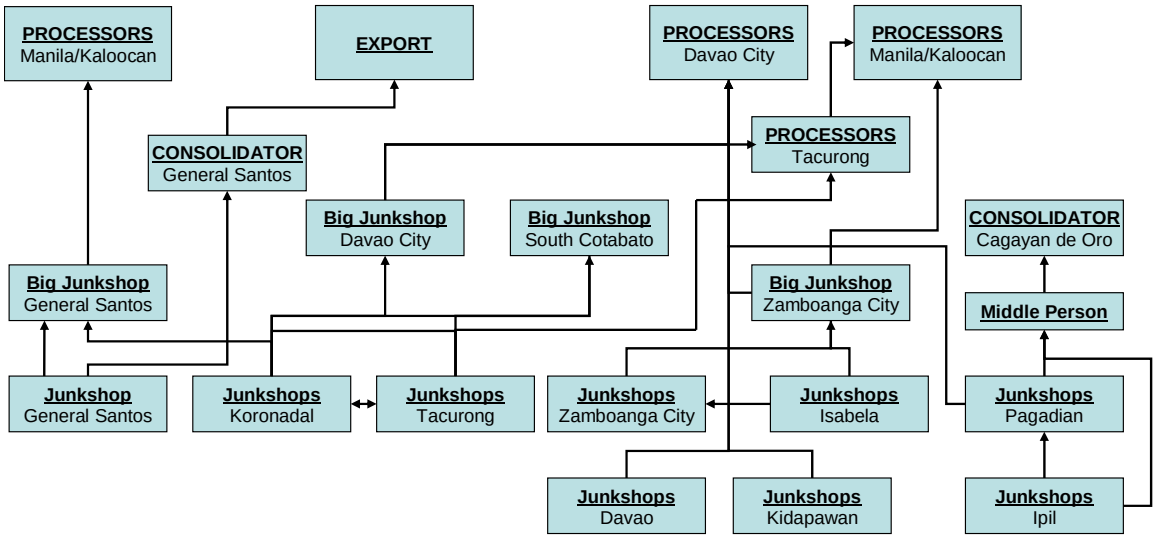

Figure 6. Market Flow of Recovered Plastics in the Study Sites

E. LIMITATIONS OF PLASTIC RECYCLING

For PET bottle recycling, the contamination with other plastics, such as PVC, which has the same specific gravity as PET, is not allowed because they are chemically incompatible. Contamination with PVC usually happens through inadvertent commingling during shipping (since PET and PVC bottles look alike) or through inclusion of bottle caps with PVC liners.

Colored and clear PET bottles have different prices, with the colored ones usually commanding lower prices. Separation is necessary because the market for mixed colored PET are limited. Moreover, pigmented PET has slightly different chemical composition than clear PET.

X. THE RECYCLABLE PAPER MARKET

A. TYPES OF PAPER TRADED

The market for old newspapers (ONP) and old corrugated cartons (OCC) in Mindanao is not as large as the bottles, scrap metals, plastics and glass containers. Only OCC have an established market in certain cities among all kinds of recyclable papers. All major consolidators from within the study area ship clean, dry and non-oil stained OCC to Metro Manila-based paper mills. Only two paper processors have been identified to be located within the study area, both located in Davao City. One processor specializes in the use of waste pre-consumer boards in the production of corrugated boxes that are sold to local shippers, visiting foreign entrepreneurs (mostly Koreans), local asparagus and fruit growers and dealers. Another processor manufactures egg and pineapple trays from waste carton and assorted papers, which are sold to poultry and fruit farms (e.g., Dole and Del Monte Philippines).

B. VOLUME OF TRADE IN RECYCLABLE PAPER

The total volume for one month recovered in all 10 sites is only about 18.4 tons from junkshops and 218.5 tons by consolidators (Table 19). The figures indicate that much of the volume recovered by consolidators come from other junkshops and consolidators not surveyed and areas outside of the 10 sites. This is a similar scenario for the other recyclables traded in the surveyed areas since the volume figures reflect only recovery from 30 percent of the total number of junkshops believe to be operating in the 10 sites.

While Davao City consolidators recover the largest volume of waste paper, on the average, the two of the six junkshops interviewed that buy and sell waste paper recover a low volume despite the presence of processors in the city. This further indicates the low demand for waste paper in the 10 sites since processing of waste paper is limited by the demand for packaging materials. It also indicates that the production of corrugated boards for cartons and other packaging materials uses virgin pulp as raw materials. In fact, interviews with processors indicated that pre-consumer waste cartons are preferred for the remanufacturing of corrugated packaging materials because of high level of contaminants in post-consumer cartons.

Table 19. Volume of Recyclable Paper Traded by Junkshops and Consolidators

City	JUNKSHOPS			CONSOLIDATORS		
	No.	Total (kg/mo)	Average (kg/mo)	No.	Total (kg/mo)	Average (kg/mo)
Cotabato City	2	9,012	4,506	1		
Davao City	2	505	253	11	176,460	16,042
General Santos City	5	2,860	572	4	30,750	7,688
Ipil						
Isabela City						
Kidapawan City				2	100	50
Koronadal City	2	15	8	1	820	820
Pagadian City						
Tacurong City	1	6,000	6,000			
Zamboanga City	1	100	100	4	10,400	2,600
TOTAL	**13**	**18,492**	**1,422**	**23**	**218,530**	**9,501**

C. PRICES OF RECYCLABLE PAPER

There are large differences in the minimum and maximum buying and selling prices for recyclable paper at the junkshop level (Table 20). For example, the buying price for ONP ranges from PhP0.50 to PhP8.00 per kg, while the selling price ranges from PhP2.25 to PhP25 per kg. The average buying and selling prices are PhP4.32 and PhP10.11 per kg, or a price mark-up of approximately 134 percent.

Table 20. Junkshop Prices of Recyclable Paper in the Study Sites

TYPE OF PAPER	BUYING PRICE (P/kg)			SELLING PRICE (P/kg)		
	Minimum	Maximum	Average	Minimum	Maximum	Average
AVERAGE	**0.42**	**4.92**	**2.08**	**1.63**	**10.71**	**5.25**
Assorted paper	0.50	5.00	2.08	2.25	6.00	8.00
Newspapers	0.50	8.00	4.32	2.25	25.00	10.11
Old Corrugated Cartons	0.75	1.50	1.11	1.50	4.50	2.46
Magazines	0.25	5.00	1.75	1.25	6.25	3.75
Selected White Paper	0.25	5.00	1.50	1.25	11.25	3.71
Assorted Shredded Paper	0.25	5.00	1.75	1.25	11.25	3.50

There is no internationally quoted spot market price and composite index for used paper. However, the export market for ONP is estimated to be the third largest in the world but is subject to very volatile prices and buying swings.[17] The prices of ONP in the US, for example, have gone down in the mid-1990s from low to negative—implying that recyclers are paid to accept ONP—as a result of a supply glut.

D. MARKET FLOW OF RECYCLABLE PAPER

The flow of recyclable paper is simple. Recovered paper from consolidators in the 10 sites is shipped to the Manila-based processors (Figure 7). A proportion of the recovered post-consumer OCC and paper in Davao City are bought by a locally based manufacturer (processor) of egg and pineapple trays. Another paper processor based in Davao buys only pre-consumer corrugated boards which are reprocessed into corrugated carton boxes for packaging fruits and vegetables. Pre-consumer corrugated carton rejected as packaging material for exportable fruits are also relabeled for domestic packaging use.

[17] Miller, 1995. Waste Age Recycling Times. The Recycling Handbook.

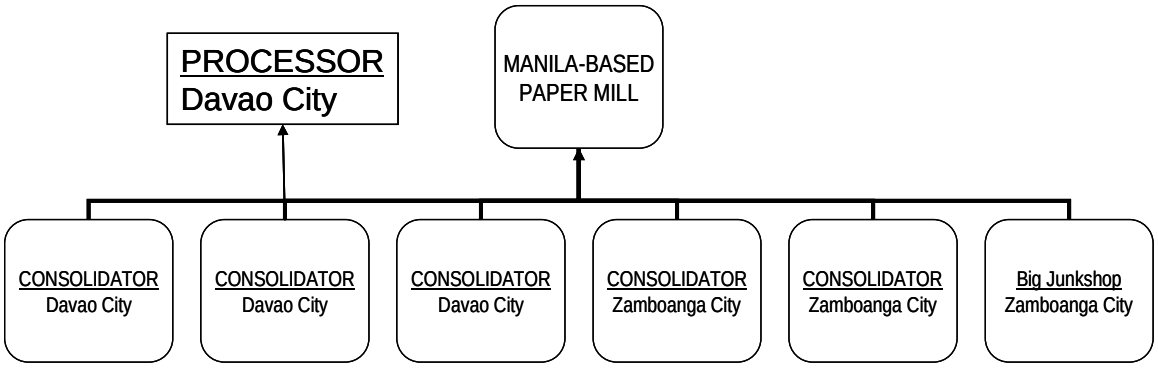

Figure 7. Market Flow of Recyclable Paper in the Study Sites

Although there is demand for shredded paper in western Mindanao, the recovery of paper is nil for Ipil, Pagadian and Isabela, and only about 100 kg per month in Zamboanga City is traded. The traded paper is mostly ONP used by market vendors as wraps. In other words, recovered newspaper once used will still end up in the dumpsites. One of the reasons cited for the low trading volume of paper is the high cost of transportation, low value of recovered paper, and stringent quality requirement. Therefore, waste paper trade is generally not considered profitable.

E. LIMITATIONS TO PAPER RECYCLING

In addition to markets, the physical nature of groundwood fibers in newsprints limits ONP recycling. Lignin in the paper fiber causes newspaper to turn yellow and deteriorate after exposure to elements or prolonged storage. Hence, ONP must be properly stored and sold to end markets within six months. On the average, ONP (or newsprint) can only be recycled eight times before the fibers become too short.

The quality of the ONP is also important. Contamination during collection can be a major problem. ONP contaminated with moisture, food, broken glass or other grades of paper is difficult to sell because the quality of the paper deteriorates, sorting and cleaning up add to the cost.

With respect to OCC, contaminants include wax coatings, plastics, chipboards, food, garbage, and commingled "yellow corrugated" boxes. Corrugated boxes, called "yellow corrugated," are not desirable because the often-recycled fiber content of these boxes have already lost much of their fiber strength; therefore, they are much weaker than other forms of OCC.

XI. USED LEAD-ACID BATTERIES

A. TYPES OF USED LEAD-ACID BATTERIES TRADED

Used lead-acid batteries (LABs) are recovered for reconditioning or remanufacturing using the recovered lead and casing. Specifically, LABs traded are 7 plates, 9, plates, 11 plates, 15 plates, 17 plates, 21 plates and 28 plates. End markets for used LABs in Zamboanga City are the small shops that recondition and resell. Some of the recovered used LABs in western Mindanao are also shipped to Manila.

B. VOLUME OF TRADE IN USED LEAD-ACID BATTERIES

Among the 10 sites surveyed, only Davao City has a local used LAB buying station. Most junkshops and consolidators in Tacurong City, Cotabato City and General Santos City ship recovered used LABs to Ramcar-Davao. In the other sites, the end market is Metro Manila where the major manufacturer of LABs using used LABs is located.

The volume data for used LABs is limited by the fact that junkshops and consolidators could not provide disaggregated information on the type of LABs bought per month. Table 16 shows the monthly lumped (for all types) volume of used LAB in all sites.

The total monthly volume of used LABs traded by all junkshops is 3,393 pieces. The average monthly volume recovered per junkshop is 48 pieces for all types—i.e., from 7 plates to 27 plates (Table 21). Consolidators in Zamboanga recover the largest number of used LABs, which is mainly due to the large volume coming from Ipil, Pagadian City and Isabela City, and presence of a reported large number of small shops that recondition LABs for local users.

Table 21. Volume of Used Lead-Acid Batteries in the Study Sites

City	JUNKSHOPS			CONSOLIDATORS		
	No.	Total (pc/mo)	Average (pc/mo)	No.	Total (pc/mo)	Average (pc/mo)
Cotabato City	9	178	20	1		
Davao City	3	58	19	11	4,534	412
General Santos City	7	118	17	4	320	80
Ipil	7	975	139			
Isabela City	4	130	33			
Kidapawan City	3	55	18	2	90	45
Koronadal City	7	132	19	1	185	185
Pagadian City	6	576	96			
Tacurong City	8	711	89			
Zamboanga City	3	460	153	4	10,400	2,600
TOTAL	**57**	**3,393**	**60**	**23**	**15,529**	**675**

C. PRICES OF USED LEAD-ACID BATTERIES

The buying price of used LAB ranges from a minimum of PhP20 per piece to a maximum of PhP400 per piece for a 21-plate battery (Table 22). On the average (for all types), the price ranges from PhP45 per piece to PhP218 per piece. The selling price ranges from PhP30 per piece (7-plate) to PhP500 per piece (28 plates). On the average, the mark-up from buying to selling is only about 15 percent. Low price mark-up could be due to certain limitations in the used LABs market. First, there is only one major manufacturer of car batteries using used LABs as raw materials. Second, junkshops compete with stores selling new vehicles or car batteries that also buy the used ones. Third, the Basel Convention also prohibits international transport of toxic and hazardous wastes, thus, the international market for used LAB is limited.

Table 22. Junkshop Prices of Used Lead-Acid Batteries

TYPE OF LEAD-ACID BATTERY	BUYING PRICE (P/pc)			SELLING PRICE (P/pc)		
	Minimum	Maximum	Average	Minimum	Maximum	Average
AVERAGE	**45**	**218**	**136**	**63**	**254**	**156**
7 plates	20	110	58	30	120	80
9 plates	30	150	80	50	175	113
11 plates	50	160	107	60	200	144
15 plates	50	240	146	140	270	188
17 plates	60	330	180	80	495	239
21 plates	110	400	225	90	500	294
28 plates	80	340	284	100	500	323
Damaged	3	3	3	15	15	15
Battery Powder	3	7	5	6	12	10

D. MARKET FLOW OF USED LEAD ACID BATTERIES

Figure 8 indicates that the end market for the recovered used LABs in the 10 sites is Manila. Zamboanga City junkshops get their supply from within the city as well as in Ipil, Isabela and Pagadian. Junkshops in General Santos City are partly supplied by junkshops in Tacurong City and Koronadal City. While it is not indicated in the flow, it is likely that the junkshops in General Santos City that ship directly to Manila are the bigger ones. The recovered used LABs from junkshops in Tacurong City and Koronadal City are either sold to Davao City consolidators or big junkshops in General Santos City. Kidapawan City and Cotabato City junkshops sell their recovered used LABs in Davao City, which are shipped to the end market in Manila.

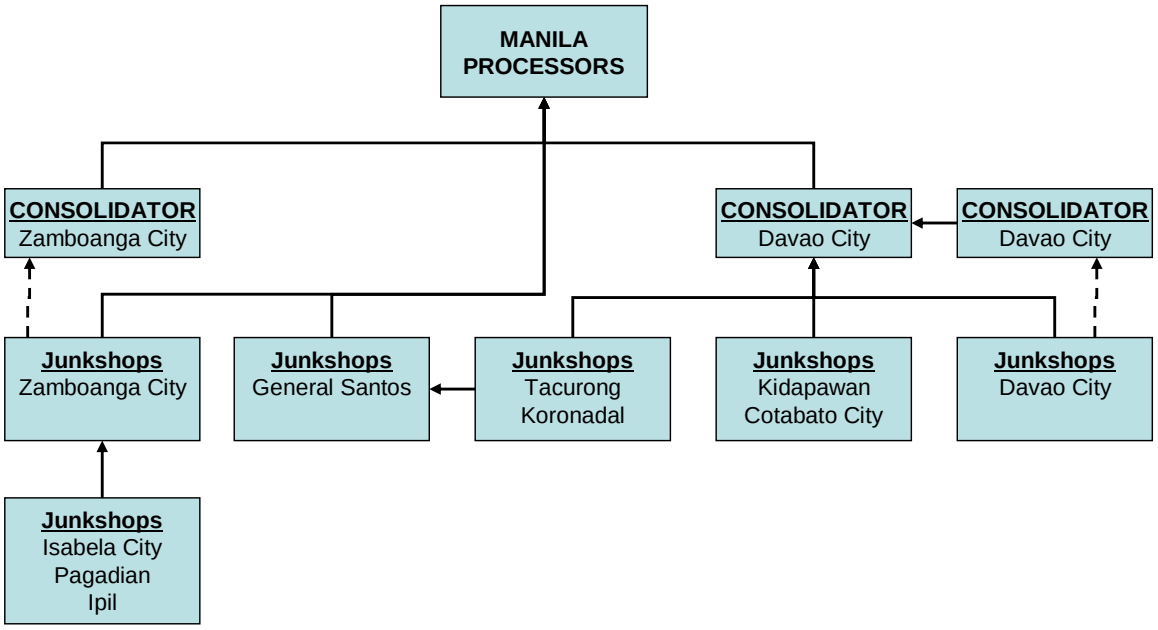

Figure 8. Market Flow of Used Lead-Acid Batteries in the Study Sites

XII. MARKETING AND FINANCING ARRANGEMENTS

There are several financing arrangements, some of which are informal, reported in the study sites. Based on survey results, in the past, junkshops commonly give out loans to itinerant buyers (i.e., buyers of junks using push carts who are usually referred to as *cariton boys*) to collect recyclables from households. However, this scheme failed and was stopped because stiff price competition between junkshops encouraged itinerant collectors to sell to other junkshops offering higher prices. In some cases, loans are not paid at all. As a result, the most practice currently followed by junkshops and consolidators is the "pay as deliver" scheme (Table 23).

Table 23. Commonly Practiced Collection and Financing Schemes among Recyclers in the Study Sites

CITY	Contracting Scheme	Collection Scheme	Financing Scheme	Pricing Scheme
Cotabato City	Open trading	Mostly delivered to consolidator	Pays as suppliers deliver	None
Davao City	Open trading	Mostly delivered to consolidator; some consolidators have buying stations and pick up materials.	Some offer financial assistance to suppliers	Higher buying price is offered to those who supply in bulk
General Santos City	Open trading	Consolidators include transportation/shipment cost with the pricing scheme	Pays as suppliers deliver	Mostly "relational" in nature; pricing depends on who shoulders transport cost
Ipil	Open trading	Mostly delivered to consolidator; trading with a middle person	Some receive advance capital from regular buyers and middle persons	None
Isabela City	Open trading	Mostly delivered to consolidator; trading with a middle person (& employs "canvassers" in sourcing for recyclables)	Pays as suppliers deliver	None
Kidapawan City	Open trading	Mostly delivered to consolidator	Pays as suppliers deliver	None
Koronadal City	Open trading	Consolidators include transportation/shipment cost with pricing scheme	Pays as suppliers deliver	Bulk versus small scale buying for metals has a usual difference of P3.00-5.00/kg in price
Pagadian City	Open trading	Delivered to consolidator and processor through a middle person	Some junkshops receive advance capital from regular buyers and middle person	None
Tacurong City	Open trading	Consolidators include transportation/shipment cost with the pricing scheme	Pays as suppliers deliver	None
Zamboanga City	Open trading	Mostly Delivered to consolidator; some hire "canvassers"	Pays as suppliers deliver	Better buying price for bulk sellers

In sourcing materials, stiff competition led to some marketing, financing and pricing schemes aimed at getting as much of the available supply of recyclables. Some junkshops, especially in Isabela and Zamboanga City, hire "canvassers"—itinerant buyers hired to source materials. In Isabela City, junkshops, except for one, operate seasonally to cope with low supply and high costs of operation. In many instances, junkshops operate during and right after major celebrations, and before classes open. Reasons for this are the need for extra cash during enrolment periods and the business opportunities offered during major celebrations—i.e., more recyclables are generated during these occasions because of increase in consumption.

In Ipil and Pagadian City, a middle person follows a contract-buying arrangement for selected materials, such as scrap metals, where accumulated materials are directly collected. The junkshop operators no longer spend for transport since the lower contract prices already account for the middle person's costs. This seems a logical arrangement for Ipil and Pagadian City which do not have major ports and where the cost of land-based transportation could be very high because of their distance to the major markets—Zamboanga City and Cagayan de Oro City.

In Davao City, some consolidators have buying offices where junkshops can negotiate the sale of recyclables. Once the prices have been agreed on, the consolidators pick up the materials. In general, bulk sellers and regular suppliers of recyclables get higher prices.

In General Santos City, pricing is "relational" in nature, i.e., preferred and regular suppliers get better prices. Prices are also adjusted depending on whether the transport cost is shouldered by the buyer or the seller of recyclable material. Trading between consolidators is common in General Santos City as a strategy to save on transport cost and provide the minimum volume to the end market. For instance, one consolidator may tack on his or her stock of metals to another consolidator who has a contract to ship a certain volume to an end market. Prices are negotiated by the two parties involved.

While some of the cities, as shown in Table 18, offer differential pricing, the setting of prices is generally based on competitive market. Junkshops differentiate between customers and play within a range of prices for a particular recyclable material. These ranges are based on the prices of end markets—consolidators, processors and importers. For instance, price setting in General Santos is generally relational—e.g., long time suppliers, friends and bulk sellers get better prices. Davao City, Koronadal and Zamboanga offer better prices to bulk sellers.

In all cases, however, trading is open and no junkshop, consolidator or processor controls the price of any recyclable. There appears to be no barriers to entry and exit of junkshop operators in all areas.

XIII. COSTS OF RECYCLING

Table 24 shows the distribution of operating costs of junkshops in nine out of the 10 sites. Out of the 70 junkshops, 53 provided cost data. There is a wide range in the operating cost. Junkshops can spend from as low as PhP11,179 per month on operation, excluding the daily working capital used in buying recyclables, to as high as PhP 33,165 per month. On the average, operating cost is approximately PhP18,689 per month per junkshop.

Table 24. Estimated Monthly Operating Costs of Junkshop Operations

City	No. of Junkshops	Item	Salaries	Utilities	Transportation	Equipment	Rent	Operating Cost
Davao City	5	Total	16,400	15,400	27,200	5,000	15,000	79,000
		Average	3,280	3,080	5,440	1,000	3,000	15,800
		Percent	*21*	*19*	*34*	*6*	*19*	*100*
Cotabato City	8	Total	29,000	14,550	55,240	1,600	12,300	112,690
		Average	3,625	1,819	6,905	200	1,538	14,086
		Percent	26	13	49	1	11	100
General Santos City	5	Total	34,000	7,147	1,250	5,500	8,000	55,897
		Average	6,800	1,429	250	1,100	1,600	11,179
		Percent	*61*	*13*	*2*	*10*	*14*	*100*
Kidapawan City	5	Total	26,500	3,350	57,500	4,180	1,500	93,030
		Average	5,300	670	11,500	836	300	18,606
		Percent	28	4	62	4	2	100
Ipil	7	Total	49,750	37,900	50,700	25,000	7,000	170,350
		Average	7,107	5,414	7,243	3,571	1,000	24,336
		Percent	*29*	*22*	*30*	*15*	*4*	*100*
Isabela City	4	Total	38,550	4,600	77,760	1,250	10,500	132,660
		Average	9,638	1,150	19,440	313	2,625	33,165
		Percent	*29*	*3*	*59*	*1*	*8*	*100*
Koronadal City	7	Total	57,800	9,250	18,000	15,850	9,150	110,050
		Average	8,257	1,321	2,571	2,264	1,307	15,721
		Percent	*53*	*8*	*16*	*14*	*8*	*100*
Pagadian City	7	Total	97,200	6,500	35,500	11,000	20,000	170,200
		Average	13,886	929	5,071	1,571	2,857	24,314
		Percent	57	4	21	6	12	100
Tacurong City	5	Total	40,000	4,640	0	0	22,000	66,640
		Average	8,000	928	0	0	4,400	13,328
		Percent	*60*	*7*	*0*	*0*	*33*	*100*
All Areas	53	Total	389,200	103,337	323,150	69,380	105,450	990,517
		Average	7,485	1,987	6,097	1,334	2,028	18,689
		Percent	*39*	*10*	*33*	*7*	*11*	*100*

Note: No cost data for Zamboanga City junkshops

Cotabato City, Ipil, Pagadian City, Isabela City and Kidapawan City reported monthly total operating costs exceeding PhP100,000. The western Mindanao area—Ipil, Pagadian City and Isabela City—reported the highest average monthly operating costs at PhP24,336, PhP24,314 and PhP33,165 per month, respectively. Davao City, Cotabato City, Kidapawan City, Isabela City and Ipil reported the highest proportion of transportation costs ranging from 30 percent to 62 percent of the total operating costs. This is because most junkshops in these cities shoulder the cost of transporting materials to the consolidators (refer back to Table 18). For Isabela, the high costs of sea-based transportation, i.e., from Isabela or Lamitan port to Zamboanga City, explain the

relatively high proportion of transportation costs (59%) relative to other operating costs. General Santos City, Koronadal City, Pagadian City and Tacurong City junkshops have relatively low proportion of transportation cost because the consolidators shoulder this. Thus, in these cities, salaries and wages comprise the highest proportion of operating cost, from 53 percent to 61 percent of total operating cost (see Table 18).

As expected, because of the high level of urbanization of Davao City and General Santos City, space rental costs are relatively high, about 14 percent to 19 percent of the total operating costs. However, Tacurong City has the highest proportion of space rental cost (33 percent of total operating cost). This may be due to the zoning policy of the local government that allows junkshop operation only outside of the city proper. Hence, operators may have been forced to rent spaces in areas where junkshop operations are permitted.

Note that equipment maintenance is a low-cost item for all junkshops, ranging from 0 percent to 15 percent. Expenditures on equipment maintenance or rental appears to be the least expense item since junkshop operation requires very little materials reconditioning. For some junkshops, mechanical presser is the only required equipment to pack plastic bottles and aluminum cans so that they can be easily baled, stored and transported. In most cases, however, reconditioning, sorting, baling and packing are usually done by the consolidators. On the average, the distribution of the operating cost is as follows: 39 percent salaries and wages, 33 percent transport cost, 10 percent utilities (water and electricity), 11 percent rent, and 7 percent for equipment rental and maintenance (Figure 9).

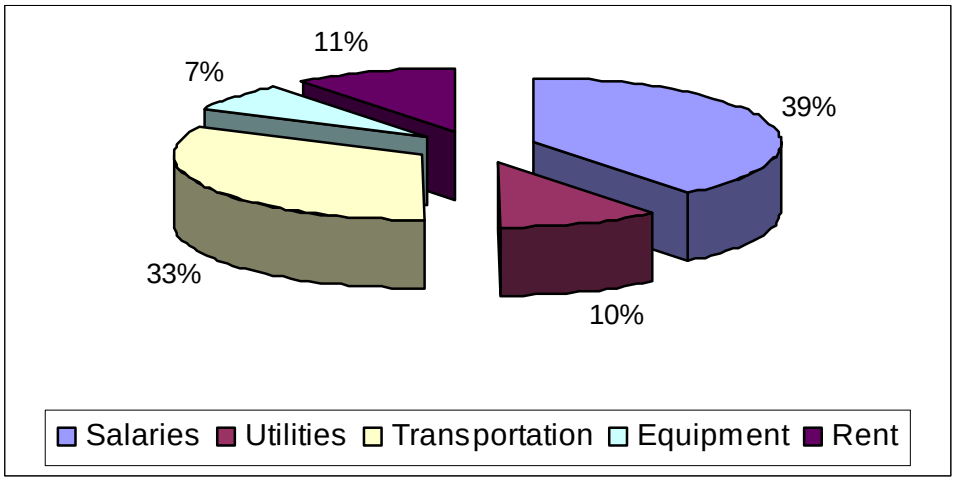

Figure 9. Distribution of Monthly Average Operating Costs for Junkshops in All Sites

For consolidators, operating costs range from PhP28,000 per month to PhP97,834 per month. Expenses for transportation and salaries comprise 75 to 90 percent of consolidators operating costs or approximately PhP 20,800 to PhP82,313 per month (Table 25). The Kidapawan City consolidators, on the average, spend approximately PhP44,000 per month, which is 69 percent of their average operating costs. The transportation costs for Kidapawan City is mostly land-based because its end markets are Tacurong City, General Santos City and Davao City.

Table 25. Estimate Monthly Operating Costs of Consolidators

City	No. of Consolidators	Item	Salaries	Utilities	Transportation	Equipment Rental	Space Rental	Operating Cost
Davao City	8	Total	370,500	58,500	288,000	18,800	46,875	782,675
		Average	46,313	7,313	36,000	2,350	5,859	97,834
		Percent	*47*	*7*	*37*	*2*	*6*	*100*
Kidapawan City	2	Total	26,000	2,800	88,000	0	10,000	126,800
		Average	13,000	1,400	44,000	0	5,000	63,400
		Percent	*21*	*2*	*69*	*0*	*8*	*100*
Cotabato City	1	Total	10,000	1,000	11,000	6,000	0	28,000
		Average	10,000	1,000	11,000	6,000	0	28,000
		Percent	*36*	*4*	*39*	*21*	*0*	*100*
Koronadal City	1	Total	20,800	3,100		2,915	0	26,815
		Average	20,800	3,100	0	2,915	0	26,815
		Percent	*78*	*12*	*0*	*11*	*0*	*100*
All Consolidators	12	Total	427,300	65,400	387,000	27,715	56,875	964,290
		Average	35,608	5,450	32,250	2,310	4,740	80,358
		Percent	*44*	*7*	*40*	*3*	*6*	*100*

Approximately 39 percent of the operating costs of Cotabato City consolidators is transportation, which is both land-based to Davao and General Santos, and sea-based to Manila. For Davao City, the lower transportation costs (37 percent of total operating costs) relative to salaries (47%) can be explained by the presence of waste plastics and aluminum processors in the City. On the average, the operating costs for all consolidators are distributed as follows: salaries—44 percent; transport cost—40 percent; utilities—7 percent; space rental—3 percent and equipment rental—3 percent (Figure 10).

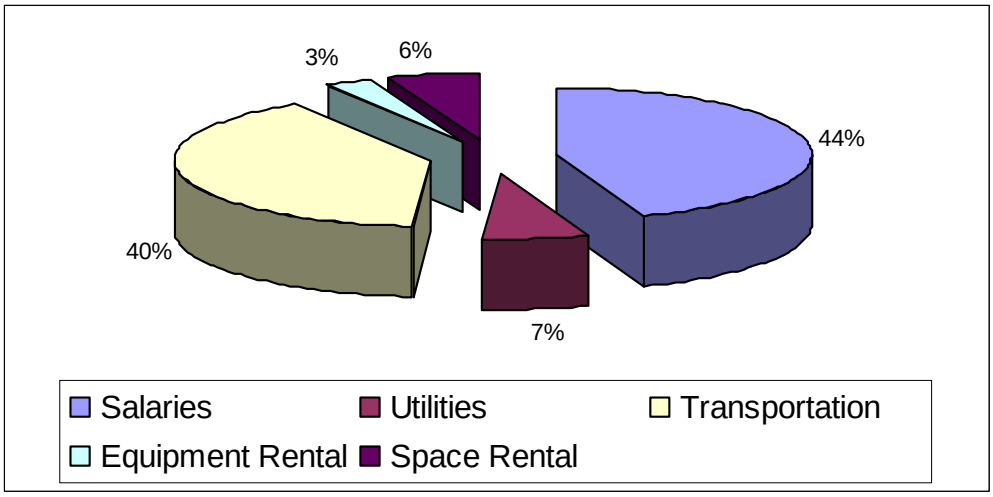

Figure 10. Distribution of Monthly Average Operating Costs for Consolidators in All Sites.

XIV. INCOME FROM RECYCLING

The standard metrics for classifying micro, small, medium and large enterprises in the Philippines is based on asset value or number of employees (Table 26). The study does not have information on asset value and only a few junkshops provided data on the number of employees. However, based on reported data on the number of employees, all junkshops can be formally classified as microenterprises with 2–7 employees on the average (Table 26). Consolidators, meanwhile, have an average of 20 employees and, thus, can be classified as small enterprises. However, the junkshops' contribution to local employment is actually more than the number of people they directly employ because the trading provides livelihood to itinerant junks collectors (*cariton boys*) and waste pickers.

Table 26. SMR Definition by Asset Size and Employment Size

Category	Total Asset Value	No. of Employees
Micro-enterprises	PhP 3,000,000 or less	1 – 9
Small enterprises	PhP 3,000,001 – 15,000,000	10 – 99
Medium enterprises	PhP 15,000,001 – 100,000,000	100 – 199

Table 27. Average Number of Employees

Recycler	Item	No. of Reporting	No. of Employees
Small Junkshops	Total	23	50
	Average		2
Large Junkshops	Total	7	42
	Average		7
Consolidators	Total	19	380
	Average		20
Processors: Large	Total	7	n.d.
	Average		
Processor: Small	Total	1	n.d.

Notes:
(1) The classification of small and large junkshops is based on revenues
Small junkshops are those with less than P100,000 in monthly revenues from sales, while large junkshop refers to those with more than PhP 100,000 in monthly revenue. The small processor in this study is a community-based micro-enterprise.
(2) n.d. = no data

Income from trading recyclables can be substantial, although it will be shown in the succeeding discussion that scrap-metals trade is the major source of income for most junkshops and consolidators. In the absence of complete data on costs, the study estimates only operating income before depreciation, which is computed as income from the sale of recyclable less the cash operating expenses.

One of the difficulties in calculating the operating income from each type of recyclable is that the costs are reported as total figures (or aggregate) and not for a particular recyclable material. To estimate, the cost per recyclable is derived as a proportion of the operating cost based on the

percentage contribution of the volume (by weight) of that recyclable to the total volume of recyclables traded. Used LABs are excluded in the computation because there is no way of converting a unit of LAB to kilograms in the absence of conversion factors. For glass containers, which are bought and sold by piece, random samples of containers commonly traded were weighed to obtain an estimate of the average equivalent weight in kilograms.

Table 28 shows that, indeed, substantial income is earned from recyclables trading at the junkshop level. The junkshops from Cotabato City, Davao City, Isabela City and Pagadian City, for instance, earn more than PhP100,000 per month from scrap metals alone. Davao City junkshops earn about PhP314,261 per month, a figure higher than that of General Santos City (PhP152,138), which is a trading node for scrap metals. The possible explanation could be the presence of processors for scrap aluminum in Davao City, hence it is able to capture much of the aluminum, which is a higher value scrap metal.

Table 28. Estimated Average Monthly Revenues and Costs from Junkshop Operations, by Type of Recyclable Material and by Site

Site	Revenue	Operating Cost	Cost of Materials	Operating Income	Revenue	Operating Cost	Cost of Materials	Operating Income
	Metals				Glass			
Cotabato City	335,000	8,170	186,885	139,945	105,600	4,085	33,264	68,251
Davao City	819,550	13,746	491,542	314,261	11,383	1,580	4,538	5,265
General Santos City	515,819	3,466	360,215	152,138	104,249	6,596	66,559	31,094
Ipil	459,714	17,765	345,313	96,635	30,064	6,571	20,329	3,164
Isabela City	479,850	20,100	248,535	211,215	11,377	4,690	7,285	-598
Kidapawan City	236,825	15,071	169,409	52,345	25,029	2,977	14,978	7,074
Koronadal City	133,672	9,747	100,028	23,897	3,718	2,201	2,720	-1,204
Pagadian City	743,280	17,506	507,745	218,029	32,627	6,565	20,007	6,055
Tacurong City	272,641	6,397	210,458	55,785	35,415	4,931	24,231	6,252
Zamboanga City	78,604	7,074	52,043	19,486	90,233	8,121	49,688	32,424
	Plastics				Paper			
Cotabato City	16,103	932	4,440	10,730	18,024	986	3,965	13,073
Davao City	5,780	413	3,502	1,865	758	74	265	419
General Santos City	30,780	996	20,520	9,264	2,145	112	429	1,604
Ipil	495	50	385	60	0	0	-	0
Isabela City	8,750	8,438	5,250	-4,938	0	0	-	0
Kidapawan City	4,038	575	3,325	137	0	0	-	0
Koronadal City	7,531	3,856	4,750	-1,075	45	8	22	16
Pagadian City	4,259	241	1,768	2,250	0		-	0
Tacurong City	11,535	1,441	7,690	2,404	12,000	562	6,000	5,438
Zamboanga City	104,167	9,375	83,333	11,458	2,500	225	500	1,775
ALL SITES	**19,344**	**2,632**	**13,496**	**3,216**	**5,912**	**328**	**1,864**	**3,721**

The least profitable of the four types of recyclables are waste paper and plastics. Data show that junkshops, on the average, earn only about PhP3,216 and PhP3,721 per month for plastics and paper, respectively. However, paper is only traded in 6 out of the 10 sites, while plastic is traded in all sites. This means that the market demand for plastics is greater than for waste paper, which is supported by the fact that there are more plastic processors in Davao City compared to paper processors. Recall that the demand for paper is mostly OCC which is reprocessed as packaging materials. In certain cities, like Isabela City and Koronadal City, where the operating costs are

relatively high, trading plastics appears to be unprofitable. In the case of Isabela City, this can be explained by the high cost of sea-based transport.

The average monthly operating income from scrap metals comprise the largest share (about 86 percent or PhP128,374) of the junkshop's monthly total operating income (Figure 11). The share of glass containers total operating income is approximately 10 percent (or PhP15,778), plastics about 2 percent (or PhP3,216), and waste paper about 2 percent (PhP3,721).

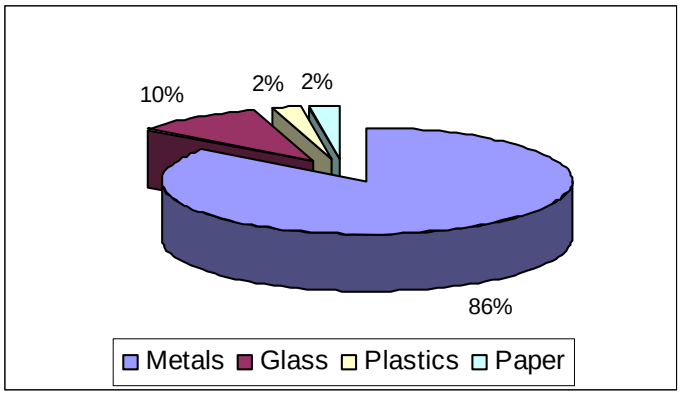

Figure 11. Distribution of Operating Income by Recyclable

On the average, the average monthly operating income (i.e., income from sales less cash operating expenses) of junkshops is approximately PhP149,599 per month (Table 29), which is approximately PhP1.7 million per year. Junkshops in Cotabato City, Davao City, General Santos City, Isabela City and Pagadian City earn more than PhP100,000 per month, with Davao City junkshops earning the highest (PhP321,810/mo). On an annual basis, junkshops in four sites (Kidapawan City, Koronadal City, Tacurong City and Zamboanga City) earn less than PhP1 million. The junkshops in Koronadal City have the lowest operating income of PhP21,634 per month or approximately PhP259,608/year, which may imply that the junkshop operation in Koronadal City is small relative to the other cities.

Table 29. Estimated Monthly Average Operating Income from Junkshop Operation in All Sites

SITE	All Recyclables (per month)			
	Income	Operating Costs	Costs of Materials	Operating Income
Cotabato City	474,727	14,173	228,555	231,999
Davao City	837,471	15,813	499,848	321,810
General Santos City	652,993	11,169	447,723	194,101
Ipil	490,272	24,386	366,027	99,860
Isabela City	499,977	33,228	261,070	205,679
Kidapawan City	265,891	18,623	187,712	59,556
Koronadal City	144,966	15,812	107,520	21,634
Pagadian City	780,165	24,312	529,520	226,334
Tacurong City	331,591	13,333	248,379	69,879
Zamboanga City	275,503	24,795	185,564	65,144
ALL SITES	**475,356**	**19,564**	**306,192**	**149,599**

Estimating the potential total operating income for the 231 junkshops provides a picture of the potential income from recyclables trading for each site (Table 30). Assuming that the LGUs are able to collect at least 3 percent of the junkshop revenues as business tax, the potential LGU income can range from PhP365,314 to PhP25.3 million annually. At 3 percent business tax rate, junkshops will still able to realize positive operating income from as low as PhP207,419 per junkshop in Koronadal City to as high as PhP3.56 million per junkshop in Davao City.

Table 30. Estimated Annual Total Operating Income, by LGU

SITE	No. of Junkshops Identified	All Recyclables (P/year)				Local Business Tax (3%)	Net Income
		Income	Operating Cost	Cost of Materials	Operating Income		
Cotabato City	17	96,844,304	2,891,325	46,625,223	47,327,756	2,905,329	44,422,427
Davao City	84	844,170,541	15,939,212	503,846,774	324,384,555	25,325,116	299,059,439
General Santos City	57	446,647,265	7,639,598	306,242,819	132,764,849	13,399,418	119,365,431
Ipil	7	41,182,862	2,048,394	30,746,232	8,388,236	1,235,486	7,152,750
Isabela City	8	47,997,811	3,189,854	25,062,758	19,745,199	1,439,934	18,305,265
Kidapawan City	5	15,953,473	1,117,398	11,262,713	3,573,362	478,604	3,094,758
Koronadal City	7	12,177,126	1,328,170	9,031,709	1,817,247	365,314	1,451,933
Pagadian City	9	84,257,870	2,625,702	57,188,127	24,444,041	2,527,736	21,916,305
Tacurong City	8	31,832,711	1,279,923	23,844,421	6,708,367	954,981	5,753,385
Zamboanga City	29	95,875,015	8,628,751	64,576,214	22,670,050	2,876,250	19,793,799
ALL SITES	**231**	**171,693,898**	**4,668,833**	**107,842,699**	**59,182,366**	**5,150,817**	**54,031,549**

On the average, monthly operating income of consolidators is approximately PhP824,243 (Table 31). The consolidators in Zamboanga City and General Santos City have operating incomes that exceed PhP1 million per month. Davao City consolidators earn about PhP795,779 per month.

Table 31. Estimated Average Monthly Operating Incomes of Consolidators

City	Revenue	Operating Cost	Cost of Materials	Operating Income
Cotabato City	88,980	28,000	60,000	980
Davao City	4,578,323	97,834	3,684,710	795,779
General Santos City	20,383,271	1,630,662	17,545,495	1,207,114
Ipil				
Isabela City				
Kidapawan City	763,064	66,334	476,669	220,062
Koronadal City	1,189,641	26,815	956,230	206,596
Pagadian City				
Tacurong City				
Zamboanga City	37,305,095	1,475,940	34,114,350	1,714,805
All Sites	**12,826,253**	**662,004**	**11,340,007**	**824,243**

The distribution in operating income per recyclable among consolidators follows a similar distribution for junkshops. Table 32 shows that scrap metals trade bring in the highest operating income among the four types of recyclable materials. Income from scrap metals is approximately PhP824,243 per month which is 90 percent of the total operating income. Among the five cities, the consolidators in Zamboanga City have the highest operating income from scrap metals,

followed by General Santos City and Davao City, which have PhP792,177 and PhP759,198 estimated average monthly operating incomes, respectively. However, for glass containers, plastics and waste paper, General Santos City is shown to earn more relative to consolidators in other cities.

For both junkshops and consolidators, the trade in scrap metals is the most profitable among the recyclables. The income from scrap metals is approximately 90 percent of the total operating income. For some small junkshops, income from scrap metals offset the loss (negative income) from other recyclables. This means that recyclables trade in the 10 sites is shaky and could potentially collapse if the demand for scrap metals fall (especially the demand from abroad) and if the supply of scrap metals dwindles. This means that the market for the other recyclables needs to be developed.

There is a very high market potential for plastics, especially PET, due to the establishment of a number of processing plants in several areas in the country for food grade plastic containers. If the local supply of waste plastics could not meet the expected increase in the capacity to domestic processing, it is likely that these newly established plants resort to either sourcing regionally (within Asia) or using more virgin raw materials. For recycled paper, Asia and Australia are the biggest markets for Europe and US. Thus far, the recovery and the market flow of paper and plastics from the 10 sites do not indicate a significant share in the domestic and international markets.

Table 32. Estimated Average Monthly Operating Income of Consolidators, by Site

City	Revenue	Operating Cost	Cost of Materials	Operating Income	City	Revenue	Operating Cost	Cost of Materials	Operating Income
METALS					**PLASTICS**				
Cotabato City					Cotabato City	88,980	28,000	60,000	980
Davao City	4,367,045	62,223	3,545,625	759,198	Davao City	65,272	5,381	54,394	5,498
General Santos City	19,443,533	1,555,483	16,915,873	792,177	General Santos City	375,840	30,067	299,777	45,996
Ipil					Ipil				
Isabela City					Isabela City				
Kidapawan City	442,011	13,745	265,383	162,884	Kidapawan City	211,554	26,958	162,840	21,756
Koronadal City	1,136,025	22,364	910,800	202,861	Koronadal City	45,000	2,816	40,500	1,684
Pagadian City					Pagadian City				
Tacurong City					Tacurong City				
Zamboanga City	36,864,000	1,474,560	33,792,000	1,597,440	Zamboanga City	276,000	180	207,000	68,820
All Sites	**12,450,523**	**625,675**	**11,085,936**	**738,912**	**All Sites**	**177,108**	**15,567**	**137,418**	**24,122**
GLASS					**PAPER**				
Cotabato City					Cotabato City				
Davao City	89,859	14,186	52,607	23,066	Davao City	56,146	16,045	32,084	8,018
General Santos City	533,148	42,652	320,235	170,261	General Santos City	30,750	2,460	9,609	18,681
Ipil					Ipil				
Isabela City					Isabela City				
Kidapawan City	109,349	25,564	48,396	35,389	Kidapawan City	150	66	50	34
Koronadal City	6,156	858	4,110	1,188	Koronadal City	2,460	778	820	862
Pagadian City					Pagadian City				
Tacurong City					Tacurong City				
Zamboanga City	149,495	1,020	107,550	40,925	Zamboanga City	15,600	180	7,800	7,620
All Sites	**177,601**	**16,856**	**106,580**	**54,166**	**All Sites**	**21,021**	**3,906**	**10,073**	**7,043**

Estimating the potential annual net income from all 23 consolidators, Table 33 shows that if we were to collect a 3 percent tax, the trade in waste plastics for the consolidator in Cotabato City will no longer be profitable. LGUs stand to earn from PhP428,000 (Koronadal City) to PhP53.7 million (Zamboanga City) annually from business taxes. Per consolidator, the net incomes translate to about PhP2 million to PhP7 million annually. However, the net income situation could become negative for most consolidators if other government taxes are levied, implying that the business of recycling will no longer be viable.

Table 33. Estimated Annual Total Operating Income and Local Tax from Consolidators

City	No. of Consolidators	Revenue	Operating Cost	Cost of Materials	Operating Income	Local Tax (3%)	Net Income
		(In thousand Pesos)					
Cotabato City	1	1,068	336	720	12	32	-20
Davao City	11	604,339	12,914	486,382	105,043	18,130	86,913
General Santos City	4	978,397	78,272	842,184	57,941	29,352	28,590
Ipil	0		0	0		0	0
Isabela City	0		0	0		0	0
Kidapawan City	2	18,314	1,592	11,440	5,281	549	4,732
Koronadal City	1	14,276	322	11,475	2,479	428	2,051
Pagadian City	0		0	0		0	0
Tacurong City	0		0	0		0	0
Zamboanga City	4	1,790,645	70,845	1,637,489	82,311	53,719	28,591
All Sites	**23**	**3,540,046**	**182,713**	**3,129,842**	**227,491**	**106,201**	**121,290**

Table 34 shows the computation of operating incomes and net incomes of seven processors. The Doy or Tetra Pack processor is a small community-based project producing slippers and bags out of recovered used Doy packs. Processor did not provide detailed information on operating costs; rather they provided information on the proportion of production cost to the price of the product and transport cost from factory to market. Hence, the net price of the product is estimated using the information provided. Like the junkshops and consolidators, the local business tax of 3 percent of the product price is an assumed value.

The prices of raw recyclable materials range from 6 to 61 percent of the product price. The corrugated board processors buy raw materials that cost more because majority of their sources are pre-consumer wastes, which are corrugated boxes that do not pass the quality control for packaging exportable fruits. For this reason, corrugated board processors also have the lowest production cost per unit because they deal with clean unused materials that need minimal conditioning.

As expected, the Doy and Tetra pack processor has the lowest operating and net incomes per month of PhP4,735 and PhP4,457, respectively. However, it is the most profitable among the processors with the net price after tax of about 48 percent of the product's selling price. This is mainly due to the low cost of raw materials (i.e., Doy and Tetra packs). For plastics, corrugated boards and scrap aluminum processors, the net prices after tax are approximately 42 percent, 33 percent and 29 percent of the gross product price, respectively. The figures indicate the percent profitability of the businesses.

Table 34. Estimated Monthly Operating and Net Incomes of Processors

Item	Type of Processor			
	Plastics	**Corrugated Cartons**	**Scrap Aluminum**	**Doy and Tetra Pack**
	Kg	Pc.	Pc.	Pc.
Products	*plastic twines and pellets*	*corrugated boxes*	*aluminum kitchen utensils*	*Slippers and bags*
Recyclable materials	*HDPE, PET,PE, PP, hard plastics, HIPS, cellophane*	*pre-consumer waste corrugated boards*	*scrap aluminum, aluminum cans and caps*	*Doy & Tetra packs*
Number of Processors	3	1	2	1
Total Production Volume (Unit/mo)	137,000	55,000	3,000	265
Average Production Volume (Unit/processor)	45,667	55,000	1,500	265
Price of Product (PhP/unit)	39	28	163	35
Price of Recyclable Raw material (PhP/unit)	8	17	46	2
Production Cost (PhP/unit)	13	1	58	14
Transport Cost (PhP/unit)	0.88	0.09	7.02	1
Total Cost (PhP/unit)	22	18	111	17
Net price before Tax (PhP/unit)	17	10	52	18
Total Operating Income (PhP)	*2,391,013*	*560,000*	*156,095*	*4,735*
Average Operating Income (PhP/processor)	*797,004*	*560,000*	*78,048*	*4,735*
Local Business Tax (3%)	1	1	5	1
Net Price after Tax (PhP/unit)	16	9	47	17
% of Product Price	*42*	*33*	*29*	*48*
Average Net Income after Tax (PhP/processor)	*743,574*	*513,800*	*70,713*	*4,457*

Table 34 further shows that, on the average, plastics and corrugated carton or board processors earn more than half a million pesos per month. Processors producing plastic twines and pellets earn about PhP797,004 per month, corrugated carton processors about PhP560,000 per month, and scrap aluminum processors about PhP78,048 per month. For the six processors, excluding the small community-based doy pack processor, the average monthly operating and net incomes are estimated at PhP517,851 and PhP480,991, respectively.[18] A comparison of the operating incomes of processors and consolidators, the figures shown in Table 33 and Table 35, previously, indicates that consolidators have higher operating income or earn more than the processors. This is most especially true for consolidators in Davao City, General Santos City and Zamboanga City, which are the trading centers for recyclables. The reasons why consolidators earn more are because: (a) they are able to spread their costs among the various types of recyclables; and (b) they earn very high profit from scrap metals. For instances, consolidators may earn less from waste paper and plastics, but this is more than compensated for by the very high profit from scrap metals and glass containers.

[18] The average operating and net incomes for the six processors are calculated by summing up total operating and net incomes before dividing it by 6.

What do the cost and revenue figures mean? The two most obvious implications are: (1) recycling is profitable; and (2) recycling costs money. Recycling, like all forms of SWM, entails costs. There is cost for collection from the household level to junkshops, to consolidators and to processors. There are storage, labor, transport, and other operating and maintenance costs. The costs borne by junkshops and consolidators reflect the potential cost of operating a centralized MRF.

The other implication of the figures is that the waste paper is very limited and not as profitable from the standpoint of junkshops and consolidators. However, there is a large potential market for recycled paper in Asia that the local consolidators and processors have yet to tap. The World Recycling Convention held in San Francisco in 2000 showed that the Asia-Australia region is the major consumer of recycled paper. The projected consumption in 2005 is 44 percent of the total world recycled paper supply and the projected largest users in Asia are China, South Korea, Indonesian, India, and to a shrinking extent Taiwan. The United States and Europe, for instance, exports about 4 million and 3 million tons of recycled paper to Asia, respectively.[19] The information is indicative of large potential market for recycled paper in Asia. However, the Philippines or Mindanao, in particular, is not able to penetrate this market at present. While there is guaranteed market for waste paper, the waste paper requirement of processing industries is being filled by imports because there is not enough waste paper locally recovered to meet the quality standard.[20]

The recyclable material with the highest demand is, as already mentioned, scrap metal because of the construction boom in other countries, particularly China, and the anticipated operation of the National Steel Corporation. In 2002, the Philippine Steelmakers' Association tried to seek a ban on ferrous scrap exports in an attempt to secure a steady supply of furnace feed. However, at least 200 local scrap processors forming the Scrap Collector and Recycler Association blocked this attempt arguing that an export ban would allow Philippine steelmakers to dictate the price of scraps.[21] Currently, ferrous scrap recyclers get prices that are more in line with international prices. Thus, the profitability is quite high. With scrap metals comprising 80percent – 90 percent of recyclers' profits, if the international demand declines in the years to come and the markets for paper and plastics are not developed, then, the recycling business will probably collapse.

[19] "Dynamic Asia a spur to world paper recycling," conclusions of the BIR Paper Division, World Recycling Convention, San Francisso. BIR Press Release, Brussels, 16 June 2000.
[20] Peña, Rox. "Dirty job?" www. sunstar.com.ph, 01 June 2005.
[21] "Philippine mills, scrap dealers fight – Scrap," *American Metal Market*, August 2002.

XV. PROBLEMS ENCOUNTERED AND ASSISTANCE NEEDED

There are several problems expressed by junkshop operators that affect business expansion. These are:

- Insufficient available reclaimed materials
- Poor quality of recyclable materials recovered
- Lack of storage capacity of junkshops
- Frequent fluctuation in prices of recyclables
- Inability of the junkshops to meet the volume requirement of buyers
- Lack of capital and/or access to financing
- High costs of operation (i.e., high cost of fuel and rent)
- Stiff competition among junkshop operators (small junkshops cannot compete with the higher prices offered by big junkshop operators)

The interview results show that the top three problems perceived by junkshop operators are stiff competition, lack of capital and/or access to financing and frequent fluctuation in the price of recyclables (Table 35).

Table 35. Perceived Problems by Junkshop Operators

Perceived Problems	% of Respondents Identifying the Problem
Stiff competition	71%
Lack of capital or access and access to financing	53%
Frequent fluctuation in prices of recyclables	44$
Not enough available reclaimed materials	30%
High cost of operation (i.e., high cost of fuel and rent)	29%
Poor quality of recyclable materials recovered	18%
Lack of storage capacity of junkshops	7%
Junkshops not able to meet the volume requirement of buyers	7%

Consolidators also consider stiff competition, frequent price fluctuation, and lack of capital and financing as major problems encountered in the business (Table 36). Lack of storage capacity is not considered a problem, while high operating cost is perceived to be the least among the problems mentioned.

Table 36. Perceived Problems by Consolidators

Perceived Problem	% of Respondents Identifying the Problem
Stiff competition	71%
Frequent fluctuation in prices of recyclables	67%
Lack of capital and access to financing	38%
Not enough available reclaimed materials	28%
Poor quality of recyclable materials recovered	28%
High cost of operation (i.e., high cost of fuel and rent)	14%

Processors consider competition for the limited supply of recyclables as their major problem. This is a valid concern considering that a large proportion of the recovered recyclables in the ten sites are shipped to Manila, Cebu or abroad. When the supply of recyclables is low, processors have to buy from Manila, which is relatively more costly than locally sourced recycles because of additional shipping and land-based transport costs.

Other challenges faced by processors are the lack of capital, limited access to financing and high transportation costs. Environmental issues and access to modern technology are considered the least of their problems. The main environmental issue identified pertains to the lack of disposal site for hazardous and toxic wastes.

Based on the problems faced, the junkshop operators and consolidators expressed the need for assistance from the LGUs and other government agencies. Recall that stiff competition, lack of capital and access to financing, price fluctuations, and lack of supply of recyclables are the major problems expressed by junkshops and consolidators. Junkshops need assistance on how to access financing, market information and market linkages, and some regulations on the price of recyclables to reduce the fluctuation and provide a more stable recycling business environment. On the other hand, consolidators expressed the need for assistance in linking them with processors and increasing access to financing. Other intervention areas which should be looked into are: provision of some tax incentives to encourage recycling; need to level the playing field by strictly enforcing compliance to the permitting systems, particularly business permits, so as to minimize illegal recycling operations; and developing the recycling business by promoting location of processing plants locally.

Table 37. Assistance Needed by Junkshop Operators and Consolidators

Expressed Assistance Needed	% of Junkshops Identifying the Assistance Needed	% of Consolidators Identifying the Assistance Needed
Access to financing	40%	33%
Assistance in marketing of recovered materials/market linkaging	33%	50%
Regulation and monitoring of buying price	18%	
Protection from the Anti-fencing Law	16%	8%
Tax incentives	11%	17%
Access to modern technology and machineries to process recyclables	9%	
Get rid of illegal recycling operation and require all recyclers to have business permits	7%	17%
Address corruption (to minimize informal fees)	4%	
Organize federation of junkshop owners	2%	
Maintain peace and order to encourage business development		8%
Encourage putting up of local processing plants		17%

XVI. SUMMARY OF MAJOR FINDINGS

There are five recyclable materials traded in the study sites—scrap metals, glass containers, plastics, paper and LABs. The trade in scrap metals provides the highest income of about 80 percent to 90 percent of junkshops' and consolidators' monthly operating income, respectively. Paper and plastics have found to be the least profitable.

The major end markets for recyclable materials recovered are Manila, Cebu City and abroad (Figure 12). Three cities are major consolidation nodes for glass, plastics and metals. Glass containers are mainly consolidated in Zamboanga City, with supply coming from junkshops in western Mindanao and consolidators in General Santos City. However, the volume traded between Zamboanga City and General Santos consolidators is not large enough compared to the volume that goes out of General Santos to Manila. The survey data showed that reported volume of glass containers traded by Zamboanga City consolidators is lower than the reported volume in General Santos City.

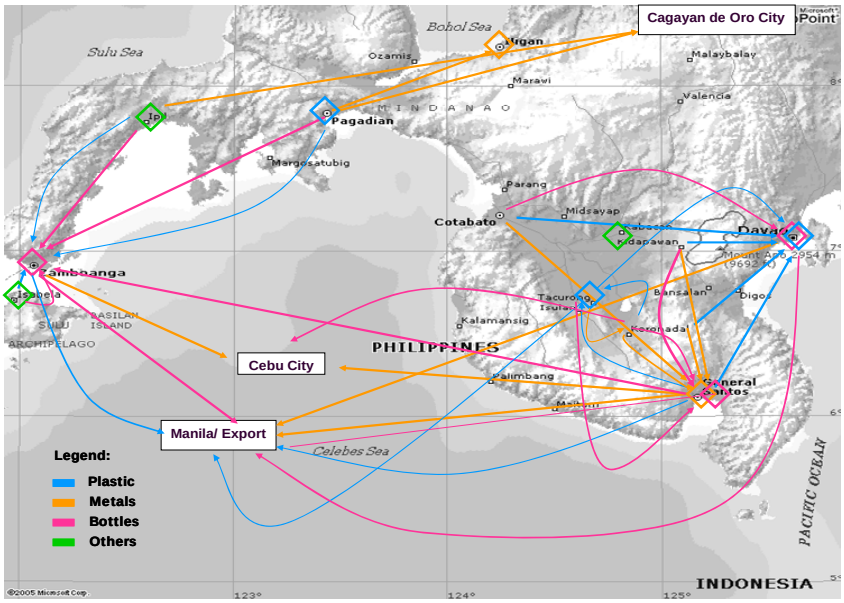

Figure 12. Flow of Recyclable Materials in Western and Southern Mindanao

It is only in Zamboanga City that broken glass containers are traded. Although the end market has not been identified, it is likely that the materials are brought to Cebu City where a major manufacturer of glass containers outside Manila that uses post-consumer glass bottle as raw materials is located.

Other than Manila, Davao City is a major consolidator and processor of plastics. This is because Davao City hosts a number of plastic processors that produce plastic twines and pellets. Davao City also hosts a number of aluminum processors. However, General Santos turns out to be the major consolidator of scrap metals in southern Mindanao. The consolidators from General Santos City sell ferrous scraps to Manila, China and Singapore, while non-ferrous scrap metals are sold to processors in Cebu City. In western Mindanao, particularly in Ipil and Pagadian City, scrap metals are bought by a middle person from Cagayan de Oro City while the ferrous scrap metals are brought to Iligan City.

Note that recyclables bought or recovered in the 10 sites are sourced not only within the LGUs, but also from surrounding areas. Smaller cities like Isabela, Ipil (town), Pagadian and Kidapawan are major markets of recyclables from surrounding islands and municipalities. For instance, Ipil receives recyclables from municipalities within Sibugay province while Pagadian City receives recyclables from surrounding municipalities in Zamboanga del Sur.

Waste paper is shown to be the least tradable and also the least profitable together with plastics. Only six sites trade paper on a small scale. In Davao City, for example, pre-consumer corrugated board wastes are preferred over post-consumer wastes due to higher quality. However, the world market for recycled paper is found to be growing, particularly in Asia and Australia. Paper manufacturers in the Philippines source their supply abroad, indicating that the collection of waste paper of acceptable volume and quality in the country has not coped with the demand for feedstock. The data in the Mindanao study sites supports this observation, the explanation being that no good segregation program for paper is in place anywhere such that the volume and quality of recovered paper are not able to meet the requirements of manufacturers. In Zamboanga City for instance, majority of the recovered old newspapers are only used as wrapping materials in public markets, and thereafter end up in the dumpsites.

Although there is an observed preference for plastic containers over glass containers because of plastics' durability and light weight, the demand for used glass containers will not likely diminish since major manufacturing plants for glass bottles exist in the country. The on-going construction of new San Miguel Corporation's manufacturing plants for food-grade plastic containers in several areas in the country, however, will likely boost the recovery and recycling of PET bottles. Currently, the Mindanao data shows that the recovery and income from plastics among junkshop owners and consolidators are still low. But plastics processors already show very high profitability, indicating that the prices of waste plastics are still low enough for processors to earn large profits.

The operating costs reported by junkshops and consolidators reflect the likely cost of a centralized materials recovery facility (MRF). The experience in most developed and industrialized countries show that developing a "formalized," centralized facility is expensive and difficult. However, the trend persists in developed countries due mainly to the shift in the labor market away from employment in the informal recovery systems, and toward mechanized waste management systems. In developing and low to middle income countries, however, centralizing the MRFs should be avoided. This is because centralized systems are very expensive to establish and manage. Money that is allocated for the establishment of a full-scale centralized MRF can be used for other necessary social services.

Centralizing the operation of the MRFs also takes away livelihood and employment of many informal waste collectors. Scavenging is most often the basis of recycling in many developing countries, including the Philippines. What needs to be done is to support the development of junkshops, which are micro-enterprises, and acknowledge them as MRFs counted towards compliance of LGUs to RA 9003. The Indonesian and Egyptian experiences show that supporting the informal systems makes sense and allow government large savings on garbage collection costs. In Brazil, municipally run ISWM programs are found to work better when integrated with street scavengers and informal scrap dealers (junkshops) because it reduced the government's SWM costs.[22]

[22] Goff, Jennifer. "Scavengers: A Behind-the-Scenes Recycling Battle," in Aquino, John T. (editor), *and Waste Age/Recycling Times' Recycling Handbook*. Lewis Publishers, Washington, D.C., 1995.

There are, however, several reasons why waste pickers are not seen positively, even though they make valuable contribution to the local economy. In many Philippine cities and urban areas, waste pickers increase the burden on local governments' garbage collection systems because they tend to scatter wastes around containers when they handpick saleable items. They also sometimes interfere with the collection in their desire to collect as much of the recyclables contained in the trash. And, third, they also interfere with the operation at the disposal sites.

In Davao City and Kidapawan City, waste pickers (scavengers) are organized so that the problems mentioned above are avoided. At the Subic Bay Freeport landfill, waste pickers are organized and grouped by shifts. Only those that are listed in each shift can enter the waste segregation section of the landfill to collect recyclables at certain times. This system avoids the problem of overcrowding and interference with landfill operation, as well as conflicts among the large number of waste pickers.

Junkshops are also often seen negatively because the foul smell of waste materials affects neighboring settlements. Second, in the absence of enforcement of sanitation and building standards, junkshops appear "dirty," endangering the health of surrounding communities, as well as the aesthetics of the place.

The recommendations to encourage recycling can be grouped into two. The first group of recommendations deals with improving the supply and quality of recyclable materials. The next group of recommendations deals with increasing the demand for recyclable materials.

XVII. RECOMMENDATIONS

A. SUPPLY-SIDE MANAGEMENT RECOMMENDATIONS

- ***Maximizing existing material recovery system***

Increasing waste diversion can be achieved through recycling and composting. With 20 percent of the LGU's wastes being recyclable, improved recycling activities will highly result in significant contribution to reducing solid waste problems. This study shows that an informal system of recovering recyclable solid waste materials is being done by the junkshops, consolidators, processors and waste pickers. In the 10 urban centers surveyed, working materials recovery systems already exist through junkshops, consolidators and waste pickers. In General Santos, Zamboanga City and Davao, for instance, there is already stiff competition for the recyclables among junkshops and consolidators, which has led to the system of employing canvassers and middle persons, and the establishment of buying stations to increase the recovery of materials. The secondary materials recovery system is, thus, thriving and working. This private sector participation is not only an efficient way of reducing SWM costs on the part of the LGUs but is also a strategy of increasing employment opportunities.

Thus, the key recommendation in the establishment of MRFs is for local government decision makers to build on existing materials recovery systems to benefit their city or municipality. This means supporting junkshops, consolidators and the informal sector (waste pickers) to improve the level of materials recovery and eventually reduce the wastes requiring government collection and disposal to landfills and dumpsites. Supporting mechanisms that can facilitate maximizing existing material recovery system include, among others:

- ***Profiling of players (junkshops, consolidators, processors, waste pickers) in the existing materials recovery system.*** Assessment of the present operations in the recycling sector and recyclable solid waste materials generated will strategically assist LGUs in deciding where to put available resources. The LGU can decide to utilize more of their resources on composting and allow the existing informal material recovery system to operate. In this way, competition between LGU's recycling facility and informal recyclers is avoided. It should be noted that the LGU should encourage private sector participation in the delivery of SWM services.

- ***Organizing junkshops and consolidators into associations.*** This will help in giving junkshop members steady buyers and more reasonable prices since their negotiation power is increased and dealers' cut is eliminated. A major problem of individual junkshops is insufficient volume of wastes collected which results in low capacity of these junkshops to supply volume requirements of buyers. Consolidators can develop mechanisms within the association on how to reduce transportation costs, especially when bringing recyclable solid waste materials to end-markets require shipping and/or long land travels. LGUs can likewise organize the informal waste pickers as barangay eco-aides who will collect recyclables from households and commercial establishments.

- ***Conduct of trainings.*** One reason for low volume of supply of recyclable solid waste materials is the inadequate capacity of the junkshops and/or consolidators to provide

good quality of materials for end-users. Trainings on proper collection, handling, sorting, storage and transportation of these recyclable solid waste materials will ensure that all collected items will likely be bought by processors and manufacturers using recovered materials as inputs. Processors, on the other hand, can be trained on new processing technologies. While the LGUs can organize trainings for these processors, assistance can also be extended by sending them to workshops/trainings/conferences on applying new technologies that are able to produce not only locally demanded recycled products but also those demanded in the world market.

- ***Strengthening market linkages among informal recyclers by the LGU.*** From the profiling done by the LGUs, this can be achieved by sharing market information on location of consolidators, processors and manufacturers, types of recyclable solid waste materials bought, prices and quality requirements. The LGUs can also facilitate negotiations among informal recyclers and, institutions (e.g., schools, churches, and government offices), industries and commercial establishments generating big volume of recyclable solid waste materials. A discussion on the incentives, marketing and transportation arrangements can be facilitated by the LGUs.

  Under the solid waste management law (RA 9003), the Department of Trade and Industry is mandated to provide support to LGUs and recyclers in recyclables market development. In particular, DTI is supposed to provide information on markets and facilitate linking recyclers to these markets. This is a very important service that government can provide and sustain in partnership, perhaps, with the local chambers of commerce and other local business organizations. LGUs can work with CTI and the local chambers of commerce and industry in providing sustained market information to recyclers.

- ***Increasing access to financial assistance.*** Financial/capital assistance to junkshops and eco-aides for buying recyclable solid waste materials can be provided. LGUs can link organized eco-aides and junkshops to development agencies and other institutions that can provide micro financing. LGUs can also link organized eco-aides and junkshops to NGOs and other institutions willing to assist them in organizing cooperatives. The experience of Linis Ganda (as well as the Zabbaleen case) is a very rich one that LGUs in Mindanao can replicate, enhance or modify to suit their needs and culture.

➢ *Issuance of Recycling-Related Local Policies*

A sustainable strategy of assisting the informal sector in improving supply of recyclable solid waste materials is issuance of local policies on:

- ***Mandatory waste segregation.*** LGUs can assist junkshops through mandatory waste segregation at source. This will ensure supply of good quality of recyclable solid waste materials as commingling and contamination will be avoided. This will also reduce costs for informal recyclers due to decreased need for cleaning/washing the collected items. In Davao City, organized waste pickers need not be segregating recyclables by hand at the dumpsite, which is not a good public health practice. Curbside collection of recyclables can be done by eco-aides if mandatory segregation is enforced. Eco-aides can be organized by barangay and assigned areas where they can collect recyclables. They can then sell their recyclables to junkshops. The barangay can provide a space for organizing

and training activities in barangay centers and eco-aides can help defray costs (space and utilities) using a portion of their materials.

- ***Development of recycling plans.*** The need for a local legislation on recycling plan, which is tied to the waste recycling and reduction goals, should be explored. Recycling plans formalize the LGU's strategies, programs and activities to promote recycling, how to achieve waste diversion goals, how communities and the private sector can participate and benefit, and what LGUs can offer to increase ***the*** opportunity to recycle. The opportunity to recycle is what LGUs offer either through organized eco-aide curbside collection of recyclables and promoting private sector-led drop-off centers and MRFs.

  Again, recognition of the critical role of communities and micro-enterprises in the whole recycling plan is important in providing comprehensive waste management services. This is because LGUs most often lack funds for complete waste collection coverage. In all 10 sites surveyed, not one LGU reported complete waste collection in all areas. In many cases, poorer communities (city slums ***and*** illegal settlements) are under-served. It is also in these congested areas where wastes pile up and the health residents are most vulnerable. Moreover, rapid population growth and urbanization will continuously strain government resources in providing basic social services. Hence, any savings from garbage collection can be used to provide other services.

- ***Strict implementation of registration/licensing/giving of business permits for junkshops***. A local ordinance mandating that all junkshops be registered/licensed/given business permits for them to be ***legally*** operating will help LGUs in monitoring operations of junkshops, thereby, proving a way in assessing intervention areas where LGUs can help in improving quality of supply of recyclable materials. A provision that should be made prerequisite before junkshops can be licensed/given business permits is compliance to standards on building construction; cleanliness/sanitation maintenance; improved sorting of recyclable solid waste materials.

- ***Segregation and recycling program in Local Government Offices.*** Taking off from the lessons of San Miguel Corporation, local government offices should implement a waste segregation and recycling program. The most common office wastes would be paper, computer cartridges and toners, plastics, and bottles. Income from the recyclables can be used to maintain an on-site ***government*** composting facility or pay for the maintenance of office facilities.

B. DEMAND-SIDE MANAGEMENT RECOMMENDATIONS

On the demand side, the national and local government units can increase the demand for recycled products through legislations on:

- ***Government procurement policy***

A policy encouraging the procurement of recycled products or products with minimum recycled content for LGUs, national government agencies and contractors, will encourage recycling. LGUs may opt to start with minimum recycled content of office paper (e.g., 25 to 50 percent recycled content) and increasingly expand the coverage to other products. Increase in the demand for

recycled paper would boost the collection of waste paper, increase the supply, and promote the development of processing plants that use waste paper as raw material**.**

- ***Recycled Content Agreements***

A national legislation requiring recycled content in products such as paper, plastics, glass and batteries, may be combined with tax incentives. For example, if government requires that, henceforth, newsprint and office paper should contain 25 percent recycled material, then, government may also provide either a price differential in its procurement of paper as part of recycled content agreements with suppliers. Government may also opt to provide tax incentives for equipment in processing post-consumer paper, etc.

- ***Economic Incentives***

There are number of economic incentives that LGUs may be able to implement. To encourage and promote the development of the recycling market, LGUs can provide tax incentives in the form of: tax exemptions for recycling machineries; income tax reduction for purchase of business-related materials made from recycled products; business tax credits or exemption for recyclers; and property tax exemptions or discounts for recyclers located in recycling zones.

- ***Zoning and Licensing***

Junkshops are often not aesthetically good especially when located within the central business district and can pose public health issues in residential areas. Certain LGUs (like Tacurong City), therefore, would prefer junkshops to locate outside of the city's commercial development zone. Locating junkshops in a particularly zone will have certain advantages. First, it will reduce the communities from potential health hazards posed by unclean materials. Second, junkshops will be easier to monitor by LGUs for compliance to licensing laws, as well as sanitation and building standards. And third, economic incentives can be provided to recyclers located within the zones. In other words, LGUs can provide a level playing field among the recyclers, eliminating or minimizing illegal proliferation of junkshop operation.

XVIII. BEST PRACTICES IN RECYCLING

There are several examples of recycling here and abroad that could provide lessons for establishing successful programs in Mindanao. The sample programs described below are either community-based, NGO-led or private-sector led.

A. PHILIPPINES

- ***Metro Manila's Linis Ganda Program***

In the Philippines the Metro Manila's Linis Ganda Program which started as small community-based program in San Juan in 1983, is now a thriving Metro Manila-wide organization of more than 500 junkshops that employs more than 3,700 eco-aides, bodega helpers and drivers who earn at least PhP200 per day. In 2003, Linis Ganda was able to collect about 209,700 tons of recyclable wastes with a value of PhP267 million.

The Linis Ganda story with a group of women attending an international conference in Geneva, Switzerland, in 1974, noted how clean and orderly were the streets and lakes. They were told that the government mandates the separation of garbage in the kitchen and collects garbage separately on specific days. The following year, they started persuading the residents of Highway Hills, Mandaluyong City, to separate their garbage, with the help of the barangay chairperson. The result was positive. Highway Hills became clean and the residents earned money from recovered recyclable wastes. Intense politics hindered the spread of the program.[23]

In 1978, the Metro Manila authorities decided Linis-Ganda was a nice program and provided PhP1.8 million to the then Ministry of Human Settlements for implementation and to establish collection centers and hire eco-aides. However, funds disappeared even before any garbage was collected. In 1983, the group of Leonarda Camacho, who initiated the Highway Hills program, was able to persuade the Metro Manila Council of Barangay Captains to take on the project. The revived program started in San Juan, Metro Manila, with a campaign and training targeting housewives and organizing, initially 10 junkshops whose eco-aides went around the town to collect recyclables. Funding came from a PhP15,000 loan from the Technology Resource Center to finance the capital of the junkshops. Eventually, the revived Linis Ganda program was able to organize junkshops (572) in the 17 cities and towns of Metro Manila into environment cooperatives and later into the Metro Manila Federation of Environment Cooperatives, now a multi-million setup that received initial funding from the congressional development fund of a senator and loans (currently totaling about PhP10million) from the Land Bank of the Philippines.

Currently, Linis Ganda has produced a *Manual on Solid Waste Management* and distributed about 100,000 copies nationwide. The program also conducts seminars on solid waste management, continuously organizing junkshops, and is setting up buying stations in Luzon, Visayas and Mindanao. It is trying to set up a National Ecology Center that will be financed by the program and its benefactors. The center will have a hydromex machine for residuals, composting facility for all organic wastes, and a tire shredder that will be capable of shredding 300,000 tires yearly.

[23] Camacho, Leonarda. "Linis-Ganda: The Story." www.mb.com.ph/issues/2004.

- ***Davao City***

In Davao City, the Anak sa San Antonio de Padua Parish (ASSAP) at barangay Agdao Central is an example of a barangay-based program designed to help rehabilitate young drug dependents. The funds collected from the sales of recyclables are used by the youth members for school.

The ASSAP was organized by the San Antonio de Padua parish in September 2003 and composed of former rugby users ages 15–21 years old and out-of-school youths. Initially, the group was engaged in a broom-making activity as a way of diverting them from drugs and other vices. When the local government began promoting the implementation the Solid Waste Management Act, ASSAP decided to engage in trading of recyclables. The barangay government provided the initial seed capital of PhP300 and transportation and began collecting waste paper and cartons, plastics, scrap metals, and glass bottles. From October 2004 to September 2005, the group earned a net income of PhP15,057.

The Davao City Chamber of Commerce (DCCCI) launched an SWM project in Toril Poblacion, Davao City. The project, in partnership with the LGU, established, among others, an MRF. The ESWM campaign was supported by capability building, IEC materials development, and technical support. Annually, in celebration of Earth Day, the DCCCI sponsors a one-day recyclable materials collection where recyclers put-up buying booths or stations in one place. Individuals, companies, business establishments, condominium associations and organizations can bring their recyclables (waste paper, broken electronic equipments, car batteries, aluminum cans, plastics, computer ink cartridges and toners, etc.) to the recycling companies. This annual event links people and business to the recyclers, so that they can bring their recyclables directly to the recyclers the rest of the year.

- ***San Miguel Corporation***

San Miguel Corporation also has a program that encourages recycling of PET bottles. Communities, schools and organizations can join the SMC program and collect a certain volume of PET bottles in exchange for a project of their choice (e.g., repainting of schools or building additional classrooms) that SMC will fund. SMC also provides training to the participants on how to identify PET from other plastics. One of the first participants to the project is the Department of Education – Makati City Branch and the Makati City government.[24]

The entire recycling program of SMC is supported by the establishment of processing plants. For PET, SMC obtained a loan from the Development Bank of the Philippines for the construction and operation of PET bottle manufacturing and recycling facilities in Luzon (Batangas, Pampanga and Ilocos), Visayas (Mandaue and Carmen, Cebu), and Mindanao (Davao City and Cagayan de Oro).[25] This project is considered the first in Asia for food-grade PET bottles manufacturing using post-consumer bottles.

For glass recycling and manufacturing, the Mandaue Glass Plant, Manila Glass Plant, PrimePak, and San Miguel Yamamura Asia Corporation, broken glass bottles are used as raw production materials for beverage bottles. The collected cullets are segregated by color, ground, mixed with

[24] Gorrospe, Oliver. "Our PET Project," *Kaunlaran,* April 2004.
[25] "DBP, San Miguel Corporation Ink P900 M Participation in Syndicated Loan Facility Agreement," in www.devbankphil.com.ph/News.

virgin raw materials, and fed into the furnace for melting. According to SMC, since the cullets melt faster than virgin raw materials, the company saves on power consumption.[26]

Within the corporate premises of SMC, the Linis Ofis Program instills the 4R-discipline (reduce, reuse, recycle and recover) in support of RA 9003. The SMC headquarters produces 400 kg of solid wastes per day and 24 percent of these are recyclable. Since the program started, sales from recyclable materials average PhP15,000 per month and steadily rising.[27]

B. OTHER COUNTRY EXPERIENCES

The previous sections demonstrate that secondary-materials markets and recovery schemes are well established in many places in the country. The same is true in other developing countries. These schemes are usually located in the informal economy and consist of either individuals or groups of waste pickers, or micro/small scale enterprises and community-based organizations. The case of Zabbaleen in Cairo and Jakarta, Indonesia, will be presented in brief to show the high level of innovation in community recycling and the benefits that the informal materials recovery economy can provide to a metropolitan area. The main lesson, however, is that there many benefits associated with a functioning materials recovery system – even from the informal ones. The focus should be in supporting and building on the existing materials recovery sector.

- ***The Zabbaleen in Cairo, Egypt[28]***

Waste collection in Egypt is traditionally undertaken by a group called Zabballeen, plural for zabbal, which means waster pickers. Each zabbal family has a collection territory where collection of wastes is done door to door. The collected wastes are then brought to their homes and stored either in the court yard or in front of their houses, where recyclables and organics are segregated by hand. The saleable materials are brought by donkey to a middle person, while the organic wastes are fed to the pigs. In this system, the zabbal family literally lives in and among the wastes.

To help the zabbaleen, some NGOs, community-based organizations and development agencies began looking for schemes to increase the income of families, provide education and training, and improve the living conditions and health especially of younger children. One scheme taught young women (as young as 10 years old) in the production of materials from waste textiles. They are brought in as apprentices in the textile trade, where for six months they are trained on how to make threads from the wastes of garment industries and weave the materials using wooden handlooms. At the end of the training period, they are each given a loan to buy wooden handlooms to start their business. They pay the loan using a portion of the materials they produce. The same scheme is used in the manufacture of products from waste paper, plastics, glass and metals.

Another scheme was to move the sorting, storage and recycling away from the settlements. Through an NGO, the governor provided a 25-hectare land 20 km away from the settlements. The Zabbaleen families were awarded rights to the land in the settlement. By selling a portion of their land, the Zabbaleen were able to build modern houses, thus, transforming the informal settlement into a suburb complete with school, health center, church and mosque. The wastes were then

[26] Fuentes, Li-Ann G. "Natural Economics: Waste as a Resource'" *Kaunlaran,* April 2004.
[27] Brizuela, Jayson B. "Clean is In," *Kaunlaran,* April 2004.
[28] World Bank – SDC. Planning Guide for Municipal Solid Waste Management.

transported to the new recycling and sorting plants by small trucks, while the workers travel by bus.

In another pilot site, recycling machineries are being manufactured. Half of the machineries produced are sold externally to provide one of the major sources of revenue; the other half is sold to refuse collectors, who then pay off the loan using a portion of the materials they produce. The conditions for receiving a loan include both literacy and training in the use of the equipment. Hence, adult literacy classes and training on the use of the equipment were provided as part of the program.

- ***Waste Picker Activities in Jakarta, Indonesia***[29]

The case of Jakarta demonstrates the benefits provided by waste pickers in terms of savings to the City. In 1988, Jakarta produced more than 21,000 m^3 tons of waste daily, of which 25 percent was recovered by about 37,000 waste pickers. The daily income of waste pickers from the recovered recyclables was about $0.75 to $3.50 per day. At present, there are at least 78 factories using recovered materials for plastics, paper, glass and metal production. The recycling rates for glass and paper are as high as 60 to 80 percent. The waste paper collected makes up to 90 percent of the secondary raw materials for the paper industry. The recovered recyclables is valued at $48.5 million per year, while the cost of garbage collection is about $0.5 million. With the current 711,180 tons of solid waste produced daily, the cost of collection, transport and disposal is approximately $8.50. However, the city saves about $270,000–$300,000 per month through the activities of the waste pickers who collect and recover the 25 percent, which are recyclable materials.

[29] The World Bank – SDC. Planning Guide to Municipal Solid Waste Management.

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