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Project

**Integration of Solid Waste Management Tools in Specific European
and Asian Communities (ISTEAC)**

Activity 23

PAPER RECYCLING SCHEMES IN THE PHILIPPINES

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1. BACKGROUND

The paper industry in the Philippines plays an important role in the industrialization program of the country, contributing to the growth of the economy and providing employment opportunities to thousands of workers. Unfortunately, it also contributes to the waste generation in the country. Most of the paper mills in the country use waste paper and cardboard products in making pulp. The re-pulping process generates solid, liquid, and gaseous wastes.

A report of the Development Bank of the Philippines indicates that the local pulp and paper industry supplies about 61% of the total paper consumption while the rest is imported (Tenorio et al., 2001). In fact, the annual per capita consumption of paper in the Philippines is 13 kg, which is still much below the per capita paper consumption of developed countries (DBP, 2005). Metro Manila and other urbanized areas in the Philippines show the highest density in paper consumption. This could increase, generating waste papers that would potentially provide enough raw materials for paper millers.

There is, thus, a great potential for recycling of waste papers. Recycling, however, in the country is still very minimal. Of the estimated 6,700 tons of wastes generated per day in Metro Manila, approximately 720 tons per day are either recycled or composted (ADB, 2004). For waste paper alone, only 60% of the 100 tons produced in a year is being recycled and the rest goes to the landfill. Waste paper is the second most produced solid waste in the Philippines, contributing nineteen percent of the total municipal solid waste production.

Waste paper contributes to nineteen percent (19%) of the total municipal solid waste in the Philippines. It is the second most produced solid waste, next to kitchen waste. Despite the generation of high amount of waste paper, the Philippine paper industry is still largely a net importer of waste paper products as its primary raw material. The important question then is why does not the local pulp and paper industry obtain all of its raw materials from local sources? Apparently, the existing paper recycling activities and infrastructure do not produce as much pulp as need by local pulp and paper industry. It is now a challenge for the local pulp and paper industry to provide the requirements for paper production.

Table 1. Municipal Solid Waste Production in the Philippines (1999)

Waste type	Percentage
Kitchen waste	42 %
Paper	19 %
Plastic	17 %
Metal	6 %
Garden waste	7 %
Others	9 %

2. OBJECTIVES OF THE STUDY

The study generally aims to determine the recycling potential and existing recycling schemes for paper in the Philippines. Specifically, this study aims to:

- review the paper industry in the Philippines;
- assess waste paper quantities and recycled paper requirement;
- study the existing paper recycling infrastructure in the Philippines; and
- propose an optimal strategy to increase recycling of paper.

3. METHODOLOGY

The following activities were undertaken in conducting the study:

- a. Observe the whole paper industry production flow from the consumers to the eco-aides to the junkshops, to the paper dealers, and to the paper recyclers or paper millers;
- b. Assess present condition and operation of the waste paper recycling industry in the Philippines, particularly in Metro Manila, where most of the key players are located;
- c. Interview officers-in-charge from paper millers, recyclers, paper dealers, junkshops, and other key players to determine the industry situation, issues, and problems;
- d. Collect primary data from the various sources such as government units, Philippine Pulp and Paper association, related studies, international materials, etc;
- e. Visit paper millers, paper dealers, junkshops, and other key players to see the actual process of paper recycling; and

- f. Survey literatures from different international and local sources.

4. REVIEW OF PAPER INDUSTRY

4.1 Introduction

Paper is a uniform, felted sheet, composed of fibrous and non-fibrous additives, which has been formed on a fine screen from a water suspension and, subsequently, pressed, dried, and calendered. The sheet may also be sized and/or coated depending on its intended end-use.

Paper has been known as one of the essential building blocks of society, but has been taken for granted in today's advanced world. Paper and related products—such as paperboard, packaging, tissue and newsprint—introduce the social fabric of the present generation. Paper is very common in our everyday lives; it is in almost every product that we use like books, tissue and sanitary products, newspapers and magazines, containers, catalogs, wallpaper, food packaging, gift-wrap, and many other staples of our daily routine. Paper fibers can be found in our computers and paper insulation in our attics, car doors, and floors. Paper is still considered the safest long-term way to store data. Even in surgical gowns, gas mask filters, ice cream, our clothes, toothpaste, film base stock, and plastics, we can find paper's cellulose-based derivative products. In fact, world paper consumption is more than 600 billion pounds every year. This totals to an average global consumption level of about 100 pounds per person, of which approximately one-third is printing and writing paper, another third is paperboard packaging, and the remainder represents all other uses combined.

The United States is a major manufacturer and consumer of paper in the world, which accounts one-third of the world's total volume, or 200 billion pounds per year. This is approximately 700 pounds of paper products for every man, woman and child in the US, year after year. The once-vaunted "paperless society" bears no relationship to reality now or in the foreseeable future.

4.2 Types of Paper

Newsprint

Newsprint is generally used in the publication of newspapers, magazines and other inexpensive literature. This paper is largely made of mechanical wood pulp.

Printing and Writing Paper

This is principally used for writing and printing purposes. Writing paper must have good printing and erasing qualities such as bonds, stationeries, certificates, and legal documents. Printing paper includes book paper, newsprint, Bible paper, among others.

Industrial Paper/Kraft Paper/Corrugating Medium/Sack

This paper type is generally suitable for packaging and wrapping purposes. Kraft paper is a strong coarse paper made from sulfate pulp, which is derived from long-fibered coniferous wood. This group includes grocery bags, heavy-duty shipping bags, and wrapping paper.

Tissue Paper

This is a handy type of paper and is creped so as to impart the required softness, absorbency, and strength. Tissue paper is used for wiping and cleaning purposes. This group includes toilet tissues, which have the property of being easily disintegrated with water, and also paper towels, which have the strength sufficient to withstand uses without disintegration.

4.3 Paper Production Process

Process Flow

- a. Raw Material Preparation. This includes sorting, cleaning and weighing of raw materials.
- b. Digestion and Cooking. Fibrous materials are cooked and subjected to high temperature and pressure in a stationary or rotary digester.
- c. Blow Tank/Blow Pit. This is where the cooked fibers are discharged to drain off the excess cooking liquor.

- d. Screening/Washing. The cooked fibers are screened to separate the uncooked fibers from the pulp. They are washed thoroughly with water in drum washers to remove the chemicals adhering to the fibers.
- e. Bleaching/Washing. The pulp produced is bleached (depending on its intended use) using closed vessels usually made up of stainless steel. They are then washed thoroughly with water to remove excess bleaching chemicals.
- f. Centricleaning. This is to eliminate dirt, minute impurities, and other foreign matters, which cannot be separated by the screen.
- g. Sheet Forming. The pulp is formed into sheets.
- h. Pressing. The wet pulp lap is pressed to remove excess water.
- i. Drying. This is to further remove the water and to maintain only the required percentage of moisture. The pulp is dried with the use of steam.
- j. Layboy. The pulp sheet is cut to the desired length, baled, weighed, and then brought to the storage area.

Table 2. Typical processes in papermaking

Using Virgin Pulp	Using Recycled Paper
<ul style="list-style-type: none"> • Pulp making • Pulp processing • Paper or paperboard production 	Pulp making <ul style="list-style-type: none"> • Pulping • De-inking • Screening • Cleaning • Washing Paper making

Typical Process Description - Using Virgin Pulp

In general, the three basic steps involved in paper and paperboard making are: pulp making, pulp processing, and paper or paperboard production.

Typical Process Description - Using Recycled Paper

Pulp making using recycled paper as raw material undergoes these key process operations: pulping, de-inking, screening, cleaning, and washing. Paper making processes are the same as using virgin pulp.

In pulping, waste paper goes to the pulper where it is broken down into individual fibers. The de-inking process separates the ink from fibers. The waste paper then goes through three types of screening, namely coarse screening, pre-screening and fine-screening. In screening, the contaminants are separated primarily on the basis of size as they pass through the screen perforations or holes/slot. In cleaning, the contaminants are separated mainly based on specific gravity/density difference with respect to fiber and water. In flotation, air is used to separate ink particles from a pulp suspension through a chemical washing process. A slusher turns the old paper into pulp and detergent dissolves and removes the ink. In the thickening process, the stock suspension is concentrated to higher consistency and white water is recovered and reused as dilution distributed so as to render them invisible to the naked eye. In washing, excess chemicals/anionic trashes as well as dispersed contaminants are removed while recovered water is loaded in wastewater treatment facility.

4.4 Paper Industry in the Global Scenario

The paper industry plays a very important role in the world economies. In 2000, this sector's global annual revenue from over 300 million tons of products exceeds 500 billion dollars, about one-third of which is attributable to the US Industry (Standard and Poor, 2000).¹ The Industry is largely based on a raw material that is derived from forest crops with harvest rotations that can approach 100 years in length.² The total volume of timber required for the industry's paper production processes is staggering. Each year, timber harvested (excluding the recycled materials used) to produce the 100 million tons of paper made in the US amounts to a ribbon of wood that, if stacked four feet wide by four feet high, would stretch over 50,000 miles, or from coast to coast 15 times. Given raw material needs of this scale, and because timber is their largest single production cost, paper firms historically have devoted enormous amounts of capital to the ownership and management of secure timber resources.

¹ Standard and Poor. 2000. "Profits Leap Ahead in '99," *Paper and Forest Products Industry Survey*. New York, Apr. 13, 2000, p. 1.

² <http://www.paperstudies.org/industry/index.htm>

Since the end of World War II, the Paper Industry has experienced a massive wave of technological change that has transformed its basic operating and process management and control systems. At present, new paper machines are nearly 40 feet wide, hundreds of feet long, and over two stories high. The Industry's capital-intensive pulping and papermaking facilities, which can cost up to 1.5 billion dollars, are designed as high technology computer-based operating systems with paper machines that run at speeds exceeding 60 miles per hour and production outputs of up to 500,000 tons per year.³

This significant technological advancement in the Paper Industry has required investment of hundreds of billions of dollars. This shift has required a highly focused effort on the part of the Paper Industry's management teams, which have devoted much of the last several decades to developing and perfecting their massive, capital-intensive operating systems. The Industry's worldview has thus been long term in focus, technically and production efficiency-oriented and, by design, risk-averse.

The Paper Industry is being buffeted with winds of global, social economic and political change that have altered permanently the historical paradigm that once drove a very successful industry.

4.4.1 Demand

Those involved in the promotion of the pulp and paper industry maintain that demand for paper products is increasing, and must be met. Paper consumption per capita and "development" go hand in hand in this context, as if by increasing paper consumption a rise in living standards will automatically occur. The United Nations Food and Agriculture Organization (FAO), for example, states: "That paper is a commodity vital to the growth and development of every country, its communications and packaging, is beyond dispute" (FAO 1986: 3). The "paperless office" is viewed as a "threat" by the captains of the pulp and paper industry (e.g. Erickson 1996: 160), and demand is seen as something that "has to be stimulated" (Clark, 1994 as cited in Kerski, 1995).

³ *ibid.*

A glance at global consumption patterns quickly illustrates that consumption is heavily skewed towards the North and the fast-growing Asian "tiger economies" (see Table 2). In 1993, the South, plus Eastern Europe, with 84 per cent of the world's population, consumed less than 25 per cent of its paper products, while the North with only 16 per cent of the population consumed over 75 per cent (Kerski 1995: 144). According to the industry view, however, low per capita paper consumption is a "growth opportunity", small scale paper mills are "inefficient" or "uneconomic", and countries of the South are "opening up for investment in the pulp and paper industry" (Johansson 1996: 25). According to Development Bank of the Philippines, the world average per capita consumption of paper is 43 kg (in India it is around 4 kg). In the US, it is 312 kg while in Western Europe it is 160 kg.

Table 3. Pulp, paper, and board consumption (selected countries) 1992-93

Country	Consumption per capita (kg)	Country	Consumption per capita (kg)
USA	333	Australia	167
Finland	266	South Korea	134
Hong Kong	233	Malaysia	82
Japan	230	Portugal	75
Singapore	230	Thailand	34
Netherlands	227	Brazil	27
Taiwan	225	Chile	27
Canada	220	China	20
Germany	200	Indonesia	13
Sweden	195	North Korea	3
UK	192	Vietnam	1
New Zealand	184	Laos	<1

Source: Chris Lang 1996

4.4.2 Supply⁴

The global paper industry churns out around 310 million tons, with North America and Scandinavian countries such as Finland and Norway accounting for 55 per cent of the output. Asia accounts for a fourth of the world production. While the European and

⁴ S. Vaidya Nathan. 2005. Global Trail of Paper Industry.

American output is largely based on soft pulp and is of better quality, the Asian production is a mix of hard wood pulp, soft wood pulp, and other agricultural residues.

The dominant theme in the global paper industry is one of consolidation. The number of 'big' players is shrinking, leading to a concentration of capacity in the hands of fewer companies. The effect of consolidation is evident from a look at the share of the top five players in different paper varieties. From 40-50 per cent, their shares have now moved up to 60-80 per cent.

In the North American markets, the consolidation levels are closer to 80 per cent. But fragmentation is still the order of the day and this does have an adverse bearing on producer discipline. The pace has been much slower in Europe and Asia with the Stora-Enso merger the only one of note. Of the 27 players in North America, 14 have become part of an acquisition or merger by another company. International Paper, the world's largest manufacturer, has spent around \$22 billion in acquisitions in the last five years. That this is big-ticket stuff is evident if one considers its \$26 billion sales in 2001.

Even as global paper majors have pursued growth through acquisitions and mergers, fresh capacity creation has been marginal (capacity growth over the next two-three years is expected to be less than a percentage point in almost all varieties of paper). In addition to the freeze on capacity creation, production is now tuned to likely demand, especially after the troubles of the last 18 months. This could help restore better balance between supply and demand, once demand improves. Whether this would lead to longer cycles of firm paper prices will be a key determinant of the industry's profitability.

4.5 Paper Industry in the Philippines

The paper industry in the Philippines comprises 39 local recycling paper mills, 6 abaca pulp mills and 1 integrated paper mill situated in the province of Surigao that has a tree plantation and supplies its own requirement for pulp to produce paper, or a total of 46 industry players.

4.5.1 Supply

The recycling paper mills depend steadily on continuous supply of waste papers to support their day-to-day operations. The local mills are committed to provide a constant supply of high quality and reasonably priced paper products serving the needs of allied and related industries.

Locally made products including their annual capacities are as follows: (a) Industrial Grade Packaging Paper, 426,000 MT; (b) Newsprint, 231,000 MT; (c) Printing and Writing, 232,000 MT; (d) Tissue paper, 35,000 MT; and (e) Kraft paper and Board, 662,000 MT. This amounts to a total capacity of 1,586,000 MT per annum. Actual production capacity at 75% capacity is 1,189,500 MT per annum.

Table 4. Annual paper mill capacity.

Paper Products	Quantity (MT)
Industrial grade packaging paper	426,000
Newsprint	231,000
Printing and writing	232,000
Tissue paper	35,000
Kraft paper and board	662,000
Total	1,586,000

4.5.2 Demand

The demand for paper and paperboard is greatly influenced by economic growth, increases in school population, and population growth. Reports show that the annual per capita consumption of paper in the Philippines is 13 kg as opposed to the world's per capita consumption of 43 kg. In the country, Manila and other urbanized areas show the highest density in paper consumption (DBP 2005).

4.5.3 Raw Materials

The primary raw materials for paper making in the Philippines are recycled fibers or waste papers. This is due to the limited supply of local wood pulp and the exorbitant cost of

imported wood pulp. There are mills that use 100% waste papers, while some combine recycled fiber with imported wood pulp at a certain ratio depending on the desired quality of the end product.

4.5.4 Environmental Impact

Although considered as one of the key players in the economic recovery, the pulp and paper industry is also regarded as one of the major sources of environmental impacts. Their production process uses significant quantities of water and discards nearly the same volume of wastewater, containing various amounts of water-conveyed pollutants besides the solid and gaseous wastes generated by the process.

4.5.5 Role of the Government

Department Administrative Order 2003-14

The cooperation program of Development Bank of the Philippines with the Department of Environment and Natural Resources (DENR) has successfully culminated in the issuance of DENR Administrative Order (DAO) No. 2003-14, which was signed on June 2, 2003. It creates the Philippine Environment Partnership Program (PEPP) to support industry self-regulation towards improved environmental performance. This new law specifically aims to establish and facilitate cooperation among environmental regulators and industry sectors towards the formulation of a stepwise approach to pre-agreed technical environmental standards.

Under this program, the DENR–Environmental Management Bureau (EMB) seeks cooperation to institutionalize at least 10 environmental management plans (EMPs) as a strategy for continuing improvement in industry performance and as basis for compliance monitoring by government. These industry groups are the Philippine Sugar Millers Association (PSMA), Philippine Cement Manufacturers Corp. (PHILCEMCOR), Pulp and Paper (PULPAPEL), Food Processing (PHILFOODEX), Semiconductor and Electronics Industries in the Philippines (SEIPI) and Alcohol Distillers Association.

Through DBP's initiatives, the EMPs of the six industry groups have been completed. These groups include cement, textile, pulp and paper, stone craft, semiconductor, and ship repair. To update these EMPs, benchmarking of selected industry sectors is being undertaken by the Bank's Environmental Management Unit (EMU), in close coordination with Swedish experts for the EMP-3B. The benchmarking activity also aims to determine the present level of environmental performance of these sectors to establish baseline parameters necessary for the formulation of industry specific guidelines.

Republic Act 9003 - Ecological Solid Waste Management Act

The Ecological Solid Waste Management Act (R. A. No. 9003) aims to transform and improve the solid waste management of the country through the following measures: source reduction and waste minimization measures, including composting, recycling, re-use, recovery before collection treatment and disposal in appropriate and environmentally-sound solid waste management facilities. The Act empowers the local governments to be responsible primarily for the implementation and enforcement of their solid waste management systems.

Local government units (LGUs) are required to: (1) establish city-level solid waste management boards; (2) develop and implement 10-year solid waste management plans; and (3) serve as members on the Metro Manila Board. The solid waste management plan focuses on source reduction through reuse, recycling, and composting. The Act stipulates that local governments must divert 25% of all solid waste through reuse, recycling, and composting by 2006. They are also required to establish reclamation programs and buy-back centers for recyclables and toxic materials. Collected toxic materials are to be sent to appropriate hazardous waste treatment and disposal facilities that meet the provisions of the Republic Act No. 6969. Furthermore, a Materials Recovery Facility (MRF) shall be established in every barangay or clusters of barangays. The MRF shall serve as a site for receiving mixed waste for final sorting, segregation, composting, and recycling.

The Act prohibits the use of non-environmentally acceptable packaging. This provision states that no sale is permitted at retail of any products placed, wrapped or packaged in or

on packaging that is not environmentally acceptable. To allow concerned stakeholders to comply with this provision, a phase out period for such packaging must be put in place after proper consultation and hearing with the stakeholders or with the sectors concerned.

The Act prohibits the establishment and operation of open dumps. The local governments are required to convert their open dumps into controlled dumps. More important for the disposal of residuals is the establishment of sanitary landfills that meet the minimum criteria. These include liners, collection and treatment of leachate, gas control recovery system, ground water monitoring well system, cover placed over the waste, closure procedure and post-closure care procedure.

Republic Act 8749 - Philippine Clean Air Act

The Philippine Clean Air Act prohibits burning of solid wastes in cities because it produces or causes air pollution. Air pollution is causing serious health problems and lower productivity, severely impacting the Filipinos' quality of life.⁵

To improve air quality, aside from boosting commercial vehicle maintenance, shifting to less polluting tricycles, requiring gas-powered vehicles to install exhaust catalysts, Manila should strictly enforce a ban on waste burning in the cities. Many of the provisions of Clean Air act have not been fully implemented, including certain specifications for cleaner fuels.

The implementation of the Clean Air Act is a national priority to combat air pollution. According to initial World Bank estimates, the government may need to spend at least \$500 million between 2000 and 2010 on implementing parts of the Clean Air Act (Philippine Star, 4 December 2002).

⁵ World Bank country official Robert Vance. Interview by Philippine Star, 4 December 2004.

5. ANALYSIS OF PAPER RECYCLING SCHEME IN THE PHILIPPINES

5.1 Recycling Background

Recyclable materials include “factory returnable” fractions such as paper, plastics, glass, metals, and also certain biodegradable materials, which are composted. They are primarily recovered at source, through community-based recycling organizations, from households and other establishments, by collection truck personnel during transfer to the dump sites, and by informal waste pickers who scour the waste piles and dump sites of Metro Manila.

The market demand for certain recyclable materials appears to be unmatched by the limited available supply. One large paper company, for instance, is willing to buy all recyclable paper materials obtainable from Metro Manila, but only 10% of its requirements can be supplied.

5.1.1 Drivers of Evolution of RA 9003 – Ecological Solid Waste Management

Due to the forced closure of two primary disposal facilities in Metro Manila, the metropolis has been without any means to adequately and safely dispose of its garbage. For most people, the garbage crisis is limited only to the collection phase. As long as mounds of the garbage are removed, the problem gets out of sight and out of mind. But the garbage crisis continues—environmentally and socially—as an unceasing tidal wave of refuse. In the absence of a functional system of waste reduction, reuse, recycling, and disposal, local government units get by the best they can.

Of the estimated 6,700 tons of solid wastes generated per day, only about 720 tons per day are recycled or composted. The balance—some 6,000 tons daily—is either hauled to the city’s dump sites, dumped illegally on private land, in rivers, creeks, Manila Bay, or openly burned, adding to the heavily polluted air shed.

Urban areas in the Philippines have come to a point where more resources are being used and more wastes are being generated than they can sustain. In the next 30 years, Metro Manila will generate over 70 million tons of solid wastes. Collection of wastes will require a line of waste trucks going three times round the earth and over halfway to the moon, with a

cumulative waste truck travel distance over 4,000 times around the earth and to the sun and at a cost over PhP100 million (ADB, 2004).

Historically, recycling operations have been informal, inefficient, and unregulated. A major accomplishment has been the passage of Republic Act 9003, the Ecological Solid Waste Management Act of 2000. RA 9003 mandates comprehensive source reduction, waste minimization, and increased recycling at the barangay level. While a good beginning, much work remains to be done. Despite the simplicity of its prescription—reduce, reuse, and recycle at the local level—the law awaits serious implementation.

5.1.2 Cost of Solid waste

Over PhP 3.54 billion (US\$64 million) is spent annually on the collection and disposal of Metro Manila's solid waste, at an average cost of about PhP 1,450.00 (\$26.40) per ton. In 2001, Metro Manila's local government expenses for solid waste management varied significantly, from 5 percent to an astonishing 24 percent of their total expenditures, with an average of about 13 percent. Majority of these expenditures are spent on private hauling contracts. Despite this high level of spending, the system requires significant improvement. Sound financial management is a key to efficient and sustainable operations.

Under the Local Government Code of the Philippines, local government units (LGUs) are mandated to collect fees for services. One of these is the collection of waste management fees from businesses, where the charges are incorporated in the annual application for business permits. Although local government units are allowed to adjust fees every 5 years, most have not. Rates remain unrealistically low. For example, a typical fast food restaurant in one city pays only PhP17 per day for waste disposal, far below the actual cost. Collection of waste management fees at the household level is being implemented only in a handful of wealthier barangays, but overall the willingness of households to pay is limited.

5.1.3 The Benefits of Recycling

Recycling paper provides several advantages. Every ton of paper used for recycling saves at least 30,000 liters of water, 3000–4000 kWh of electricity (enough for an average 3 bedroom

house for one year), and 75% of air pollution. Producing recycled paper involves between 28-70 percent less energy consumption than virgin paper and uses less water. This is because most of the energy in papermaking is used in the process of pulping to turn wood into paper.

Recycled paper produces less air (95% of air pollution). Recycled paper is not usually re-bleached and if it is, oxygen rather than chlorine is usually used. This reduces the amount of dioxins, which are released into the environment as a by-product of the chlorine bleaching processes. For every metric ton of recycled paper, seventeen trees are saved. Recycled paper reduces water pollution by 35 percent and uses 60 percent less water than the manufacture of virgin paper. Every metric ton of recycled paper eliminates the need for 3 cubic meters of landfills given that paper comprises 55 percent of today's landfills, plastic about 14 percent.

5.2 Existing Paper Recycling Infrastructure

5.2.1 Types of waste papers

The main types of paper in everyday use, which can be recycled, are office white paper, newspapers, magazines, telephone directories and pamphlets, cardboard, mixed or colored paper, and computer print out paper. There are also different grades of paper and board collected mainly from agricultural and industrial sources. There are about 50 different grades for paper recycling companies to deal with.

Waste papers generally come from two sources: (1) pre-consumer waste paper; and (2) post-consumer waste paper. Pre-consumer waste papers are converters and printers. They convert paper rolls into final usable paper products such as bond papers, notebooks, folders, etc. Excess cuts and rejects are usually considered as waste papers. Newspaper over-issues, printer rejects, overruns, etc. contribute also to waste papers. Post-consumer waste papers are from industry, commerce, public and private administration, and other consumers including households. Office papers and newspapers are the most produced waste papers from industries and households.

Sources of waste papers differ per type. Old newspaper, for example, mostly comes from excess prints of the national daily newspapers such as the Philippine Daily Inquirer, Philippine Star, Manila Bulletin, and Manila Times. White paper mainly comes from private offices and junkshops. Ayala Foundation, in partnership with Carpel Trading Inc., advocates and promotes paper recycling among its members. In addition, the commercial and residential establishments in the Central Business District of Makati set up compartmentalized garbage depositories and receptacles to ensure waste segregation at source, a basic requirement of the Solid Waste Management Program being implemented by the Makati Commercial Estates Association (MaCEA).

5.2.2 Recycling flow – Collection and Recovery

From consumers (households) to junkshops

Households are the primary generators of waste papers. They are the major suppliers of old newspapers. Collection of old newspapers from households is accomplished through waste-pickers or eco-aides. Eco-aides go from house to house to buy old newspapers. Eco-aides roam around a certain area, usually wear green uniform t-shirt, and use green pushcart or bicycle with sidecar to collect recyclable items. They often go to households in many residential subdivisions and are able to collect many old newspapers when they are allowed to enter the subdivision. In some cases, however, residential subdivisions do not allow eco-aides to enter their area to pick-up old newspapers.

Eco-aides are employed by junkshop owners or a non-government organization engaged in recycling to collect recyclable items or recyclables such as paper, plastic, whole and broken bottles, aluminum, tin cans and steel form households. Junkshop owners usually provide eco-aides with the pushcarts or “caritons”, worth more or less PhP 3,000.00 and an average initial capital of PhP 500.00. Eco-aides use this money to buy newspapers from the households. Table 5 provides the price list used by eco-aides when buying these items from households and other small establishments as of January 2005 based on Linis Ganda’s price list.

Most eco-aides who collect recyclable materials in Metro Manila are part of a network organized by the Linis Ganda Foundation. The network includes the Metro Manila Federation of Environmental Multi-Purpose Cooperatives. The federation's 17 individual member multipurpose cooperatives represent the 17 local governments of Metro Manila and comprise 572 junk shops, 2,500 junk shop workers, 1,299 eco-aides, and 132 drivers.

Table 5. Eco-aides' Price List of Waste Paper

Type of waste paper	Cost in Peso
Assorted (folder, newsprint, scratch papers, receipts without carbon)	0.50 / kilo
Newspaper	3.50 / kilo or 20.00 / <i>dangkal</i> ⁶
Carton	1.00 / kilo
Magazine	0.50 / kilo
Selected white	0.30 / kilo

Source: Metro Manila Federation of Environment Multi-purpose Cooperative, 2005.

Junkshop owners also employ helpers and sorters to sort waste papers collected before bringing them to the waste paper dealers. Junkshops act as the gateway to the market both for recyclable materials and information about them—price, quality, minimum volumes, and new demand for materials. The junkshops are one step away from the dumpsite, and often a step ahead of it. Owners of junkshops prefer to obtain their materials close to the source, so as to maximize volume, quality, and homogeneity and to minimize transport costs.

From consumers (commercial and institutional) and junkshops to paper dealers

Post consumers such as private offices, supermarkets, and stores supply a more stable quantity of waste papers than households. They sell used papers directly to paper dealers rather than to junkshops. For corrugated cartons, paper dealers are granted a contract by

⁶ Dangkal is a measurement term used by Filipinos. It spans from the tip of the thumb to the tip of the middle finger.

suppliers through bidding. Generators of waste corrugated cartons include supermarkets, grocery stores, and department stores. Duration of contract depends on the establishment or office. For instance, Asian Development Bank granted a five-year contract to a large paper dealer to collect all of its solid wastes, including plastics and other recyclables. Shoe Mart (SM), a major owner of large shopping malls, usually grants one-year contract to dealers of waste papers.

Paper dealers also obtain waste papers from junkshops. In most cases, junkshops provide waste papers to paper dealers already sorted. Other suppliers, however, like industries and establishments, do not sort their waste papers, one reason why dealers still have to employ seasonal sorters. Dealers supply papers that are sorted to paper millers as a value added service.

Paper dealers are mostly based in Metro Manila mainly because most paper recyclers and millers are also located within Metro Manila. Supply of waste papers also comes from other parts of the Philippines, such as Baguio, Isabela, Nueva Ecija and Olongapo in Northern Luzon, Lucena, and Bicol region in Southern Luzon, and Cebu and Tacloban in the Visayas. The price of waste papers from these places is almost the same as the price in Metro Manila. Dealers usually pay for the landed fee of waste papers if they are being shipped from outside Manila. Added cost on freight is about PhP 0.30 to 0.50 per kilo. Paper dealers nationwide provide a monthly price list to their suppliers. The mark-up price of waste papers is average of 50 centavos from junkshop's and other supplier's price. Table 6 below provides an average selling price list of paper dealers as of July 2005 based on the interviews conducted.

Table 6. Price List of Paper Dealers

Waste Paper Type	Price per kg (Pesos)
White paper (with print)	10.00-11.00
Old Newspaper	7.00-7.50
Mixed /Assorted paper	2.50-3.00
Corrugated Cartons	4.50-4.70

Most paper dealers own warehouse, trucks, forwards and elf trucks for their operation. Carpel Trading Inc.⁷, the largest paper dealer in Metro Manila and probably in the whole Philippines, has a “bailing” machine to compress paper and maximize weight. Aside from the regular employees, most paper dealers employ “pakyawan’s” or “arawan’s” for sorting of waste paper. “Pakyawan’s” and “arawan’s” are irregular employees who are hired per day to day basis. They are usually hired during the peak season wherein paper dealers need many sorters. They are paid according to the accomplishment of workload and not per day. Though not organized into association, most of the paper dealers knew each other.

From paper dealers to paper recyclers / millers

The main market of paper dealers is the paper millers or paper recyclers because the primary raw materials for paper making in the Philippines are recycled fibers or waste paper. Most millers utilize 100% waste papers while some combine recycled fiber with imported wood pulp at a certain ratio, depending on the desired quality of the end product. For example, 100% virgin pulp is required for facial tissue while 100% waste paper is used for industrial grates. For white paper, a combination of local and imported waste paper is used. Virgin pulp used in local paper production is mostly sourced from Indonesia and Malaysia, where it is widely grown and the price is low.

Though price of waste paper from paper dealers is high, almost all paper millers source their raw materials from them. The high price is balanced by availability of sorted waste papers, allowing paper millers to save on collecting and sorting costs.

Despite availability of local waste paper supply, the Philippines remains largely a net importer of paper products because the local industry is not yet able to supply all of the country's requirements. Local waste papers are recycled 4 to 6 times since there is no virgin pulp production in the Philippines. The use of waste papers several times makes fibers weaker and inferior for use in paper production compared with imported waste papers.

⁷ Carpel trading is registered with the Department of Trade and Industry in 1987. It is owned and managed by Engineer Jose Teves, also the president of Metro Manila Federation Environment Cooperatives (LINIS GANDA) and a member of the Recycling Movement of the Philippines. Carpel, which stands for Carton and Papel, is engaged in the buy and sell of scrap paper and other paper products and trucking services.

Imported waste papers, however, possess high quality fiber. Imported waste papers are usually sourced from US, Canada, Japan, Europe, Saudi Arabia, Indonesia, Malaysia, and China. Demand for imported waste paper depends on the desired quality of the end paper product. White bond paper requires mixture of imported waste paper with local ones, while industrial grades do not require imported waste paper. Transnational Paper Mill uses 100% local waste papers in its production of corrugated cartons. Percentage or ratio of imported waste paper to local waste paper varies with the desired characteristics of paper products.

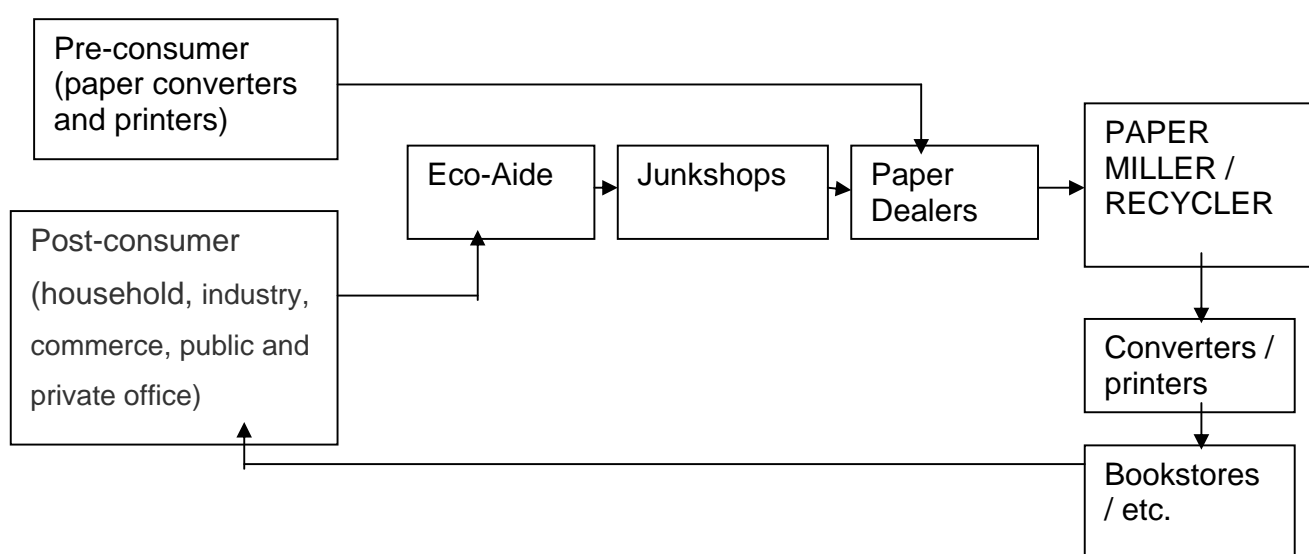


Figure 1. Flow of waste papers.

5.2.3 Issues and problems in Paper Recycling Flow

Waste paper generators

Most households in the Philippines do not segregate their wastes at source. This is the reason why only few waste papers are being recovered. Most households, especially from the lower class are, not aware of the benefits of recycling in general and paper in particular. Most of them dispose their waste papers with other solid wastes. In addition, business establishments still do not practice waste segregation or re-use paper. Like households, businesses dispose their waste papers together with the other municipal wastes.

Junkshops

One of the usual problems encountered by junkshops, particularly by the eco-aides, is being discriminately apprehended by police authorities and the MMDA (Metro Manila Development Authority). This affects their efficiency in collecting scrap materials including waste papers. To address this problem, the Federation of Multi-purpose cooperatives or LINIS-GANDA already had a dialogue with the proper authorities to avoid such problems.

Junkshop owners also experience problem with their own employees, particularly the eco-aides. There are instances where boorish eco-aides ran away with the “pushcart” and initial capital provided to them. Some abusive eco-aides also cheat from their junkshop employers by adding weight on the waste paper collected. In other instances, junkshop owners may not have enough money to buy recyclables from households. To address this concern, junkshop owners borrow money from cooperatives to provide additional capital to buy recyclables from households. Cooperatives in turn apply for loans from development banks to allow them to lend money to junkshop owners.

Dealers

Paper dealers face competition from existing and emerging competitors. Paper dealers also face threat from the entry of imported waste papers, whose price, especially during low season, is almost the same as the price of local waste paper. Prices of local and imported waste papers vary with the type of paper. Below is a comparison of the average price for local and imported waste paper on white bond and kraft paper based on information obtained from interviews with key persons in the industry.

Table 7. Comparison of local and imported price of waste paper

Waste paper type	Local Price in Peso	Imported Price in Peso
White Bond	18.00 /kg	30.00 /kg
Kraft Paper	5.00 /kg	9.00 /kg

Another problem for paper dealers involves trustworthiness of employees, especially during sorting of waste papers. Sorters do not properly sort waste papers. Dealers also have

to deal with junkshops owners who insert objects in order to increase the weight of paper. Others junkshops spray water to increase the weight. Heavier waste papers command higher price. Paper millers, on the other hand, deduct the peso equivalent of the moisture content of the waste paper from the price they pay to the paper dealers. This becomes problematic during rainy season when it is very humid and papers easily absorb humidity.

Dealers use trucks for delivery and pick-up of waste papers, but can not use them all the time on major streets because of the truck ban policy during certain hours in Metro Manila. This limits the number of times dealers deliver waste paper to paper millers. The entry of imported finished products such as note books, tissue papers, pads, etc. depresses demand for local paper production paper industry. Finished products usually came from China and Indonesia, where products are generally cheaper. Low production in millers results low demand for waste papers from dealers.

Another common problem is collection of payment from paper mills/recyclers. Paper dealers pay cash to junkshops and other suppliers of waste papers, but are paid by millers on specified terms. Delay in payment also means delay in purchasing waste papers.

Recyclers/Millers

Economic crisis have a major impact in the whole local paper industry. Several paper mills have shut down and experienced regular downtime. United Pulp and Paper Corp. (UPPC) President and Chief Operating Officer Magdaleno B. Albarracin, Jr. said that achieving global competitiveness requires continued machine efficiency and minimizing machine downtime. He said the paper industry is still having a difficult time due to the Asian financial crisis. He added that the amount of paper consumption in the country is indicative of the nation's economic condition, which goes down with economic activity. Lower demand for paper could result in reduced paper production. Scheduled and unscheduled shutdowns of machines translate to significant losses for the company. Downtime or unscheduled shut downs may also result from the lack of raw materials for production. If supply of raw materials is not enough, then the company would have to schedule a shutdown.

Paper millers can not increase the prices of paper because the Philippines is being dictated by the world market. When the Philippines formally joined the GATT in 1980 as a contracting party, the main market access commitment came in the form of tariff bindings.⁸ If the local prices paper go up, it would be easy for the imported paper products to enter the local market. The local paper industry is complaining about the non-uniformity of tariff in different countries. The Philippine has one of the lowest tariffs so it is easier for any neighbor countries to export to the Philippines rather for the Philippines to export to them, according to Victor Pascual, Vice President of Container Corporation of the Philippines.

Paper millers usually compete among themselves in buying waste papers from the same suppliers of waste papers or paper dealers. Dealers usually choose to deliver waste papers to millers who pay on time.

5.2.4 Waste Paper Collection and Recycling

Waste Collection⁹

Under RA 9003, the local government is responsible for collecting non-recyclable materials and special wastes, while barangay units are given the task and responsibility of segregating

⁸ A tariff binding, normally undertaken for specific products, is a level of tariff which a contracting party commits not to exceed. When the Philippines joined the GATT, tariff bindings were undertaken for about 5% of the total tariff lines (i.e., scope of bindings). At the end of the Uruguay Round in 1994, some 3,664 tariff lines, or around 65% of the total 5,639 tariff lines of the Philippines, were bound. Of these, 2,859 comprised industrial tariff lines (or around 51% of the total), while agricultural products covered 805 tariff lines (or 14% of the total). For the balance of 1,975 tariff lines, there are no tariff commitments in the WTO. On a product group basis, the scope of bindings varies considerably, ranging from zero (i.e., no commitments) to 100% (i.e., all tariff lines within that product group were bound). All agricultural tariff lines were bound because this was a basic feature of the WTO Agreement on Agriculture. However, as will be seen further on, the level of tariff bindings will be more revealing; relatively high scopes of bindings were also committed in textiles and clothing, non-electric machinery and chemicals, largely on account of requests from industries to lock-in the declining trend in the import cost of raw materials and intermediate inputs. Moderate scopes of bindings can be found for electric machinery, other manufactures and minerals. The bulk of products relating to information and communications technology fall under the first two product groups; and relatively low scopes of bindings apply to wood, pulp, paper, furniture, footwear and travel goods, transport equipment and metals; while very low if not non-existent bindings apply to fisheries and energy products. Scopes of bindings apply to wood, pulp, paper, furniture, footwear and travel goods, transport equipment and metals; while very low if not non-existent bindings apply to fisheries and energy products.

⁹ ADB. 2004. The Garbage Book: Solid Waste Management in Metro Manila.

and collecting biodegradable and reusable wastes. Of Metro Manila's 17 cities, 11 contract out garbage collection to the private sector and 6 collect garbage themselves as part of their local government functions.

Waste Paper Collection and Recovery

Waste Paper in Metro Manila is collected by a Federation called LINIS GANDA or Metro Manila Federation of Environment Multi-Purpose Cooperative. It is a registered cooperative established in 1996, which is composed of 17 municipalities in Metro Manila, with membership of 575 junk shop owners who employ more than 5,000 eco-aides and bodega helpers. The federation has gone a long way in helping our government in reducing garbage in the dumpsite since its establishment in 1996. In 2000, about 350,000 households were paid about PhP 132.53 million for the 101,850 tons of paper, plastic, bottles, aluminum and tin cans, and steel sold to the eco-aides. In 2001, 450,000 households were paid about PhP 157.2 million for the 120,161.77 tons of recyclables. In 2002, about 450,000 of 1.5 million households of Metro Manila paid PhP 231.6 million for the 182,051 tons of recyclables and in 2003 were paid PhP 267.2 million for the 209,770 tons of recyclables.

TABLE 9. Waste Recovery in Metro Manila

Year	Material Purchased (tons)	Value (million pesos)
1998	69,400	95.2
1999	95,600	124.5
2000	101,850	132.5
2001	120,162	157.2
2002	182,051	231.6
2003	209,770	267.2

Source: Report of the Metro Manila Federation of Environment Multi-Purpose Cooperative, Bong Teves, March 1, 2001

Linis Ganda recycles only 4.5 percent of the wastes generated in Metro Manila. The group hopes to increase its recycling activities to 15 percent. The expansion would require 1,000 additional junk shops and 2,500 eco-aides. Of the 100 tons of waste papers produced in the Philippines, only 60% is recovered and the rest goes to the dumpsite (Yu, 2005). Table 8

show figures on the total collected recycled paper in Metro Manila for the year 2004. Cartons account for the highest number of waste paper collected in Metro Manila. Quezon City has the highest number of collected waste paper within Metro Manila. Pateros has the lowest number of collected waste paper.

Table 8. Collection of Recycled Paper per city in Metro Manila in 2004

City	Cartons	Old Newspaper	Waste Paper	Total
Caloocan	3,512.33	2,029.05	1,452.07	6,993.45
Las Pinas	3,347.36	1,799.52	571.86	5,718.74
Makati	1,872.05	1,008.43	505.76	3,386.24
Malabon	832.59	744.47	620.18	2,197.24
Mandaluyong	1,460.43	1,071.65	988.03	3,520.11
Manila	2,009.05	2,357.48	1,389.00	5,755.53
Marikina	1,732.47	2,550.79	1,800.89	6,084.15
Muntinlupa	1,588.51	1,724.36	1,408.87	4,721.74
Navotas	1,459.25	1,748.96	1,408.23	4,616.44
Parañaque	1,554.24	1,322.73	971.52	3,848.49
Pasay	2,109.48	1,437.18	1,168.66	4,715.32
Pasig	1,956.46	1,650.24	1,239.61	4,846.31
Pateros	810.10	271.31	581.36	1,662.77
Quezon City	31,222.07	11,735.31	16,439.64	59,397.02
San Juan	1,440.06	2,330.30	1,252.37	5,022.73
Taguig	1,389.18	1,714.70	920.46	4,024.34
Valenzuela	1,864.20	1,185.32	1,937.39	4,986.91
TOTAL	60,159.53	36,681.80	34,655.90	131,497.43

Source: Metro Manila Linis-Ganda, 2004.

Schemes and systems

The countrywide collection efficiency in the Philippines is estimated to be 40 percent, although major towns and cities show average collection rates of up to 70 percent. The poorer areas of cities, municipalities, and rural barangays are typically unserved or under-served. Inadequate collection vehicles and lack of disposal sites have contributed to a

reduction in the collection efficiency of household wastes. Seventy percent of the garbage collected in urban areas, while only 40 percent is collected in rural areas. Separate collection of segregated wastes is still minimal. Thirteen percent of Metro Manila's waste is recycled, while it is much less in other areas (PEM 2002).¹⁰

Municipalities and cities have the primary responsibility for collection in the Philippines. Municipal solid waste collection is done either by self-administration, through private contractors or by the residents themselves. The manner and frequency of collection and the choice of equipment depends on the size of roads, density of population to be covered, and affordability. In neighborhoods with narrow roads, household waste is dumped into communal receptacles placed strategically on larger roads, which are then removed by trucks.

5.2.5 Processing of Waste Paper

Firstly, the paper needs to be sorted, so that items such as plastic wrapping strips, paper clips and staples can be removed. Then the paper is shredded, beaten into a fibrous pulp and mixed with water and chemical preservatives in pulping machines. The pulp is pressed through giant rollers that flatten it into sheets and squeeze out the moisture; it may also be dried in furnaces, with blast of hot air. The paper is then cut to the desired size and shape and packaged for distribution.

The conversion of waste paper to finer grades suitable for printing involves a few more steps. First, careful sorting is required. Waste paper is divided into categories such as newsprint, typing and computer paper, and magazines, which have shiny paper and colored inks and need special treatment. Next, the ink is removed. This is done by soaking the paper and breaking it up into small pieces in giant washers, then treating it with chemicals that loosen the ink so that it can be rinsed away. Sometimes more than one such chemical must be used because many types of ink must be removed. Finally, the wet, shredded waste paper is blended with other materials according to the type of end product that is desired. Rags, which are still used to produce the finest, most expensive grades of

¹⁰ World Bank. 2002. Philippine Environment Monitor 2003.

paper, may be mixed in. Wood pulp and other forms of cellulose such as straw may also be added in varying proportions. If white paper or paper for greeting cards or stationery is to be produced, bleach may also be added to lighten it; if newsprint is to be produced, a mixture of red and blue dyes is added to reduce the greyness of the final product. Chemical preservatives are also added.

At this point, the fully treated material is a sort of liquid sludge that is ready to be made into paper. Papermakers call this sludge "stuff". In most papermaking operations, the stuff passes through a machine called a beater, which is essentially a very heavy roller that presses the fibers in the stuff together and squeezes out the water. The paper is formed and held together by the natural interlocking of the long cellulose or rag fibers as they are pressed and dried. No glue is used in the process. In fact, the natural glue in wood, lignin, is removed chemically before the paper is made. A refining machine brushed the roll of stuff to smooth out irregularities. The papermaking machine presses the stuff into thin slices, which are then further dried by pressing or in furnaces. Finally, the paper is polished or chemically treated to give it the proper finish and packaged as ordered by the customer, in cut sheets or rolls.

The papermaking process itself is pretty much the same whether one uses virgin materials, recycled materials, or a mixture of the two. The difference is in the preparation of the stuff. Recycled material requires careful sorting. This in turn means that the paper mill must have a place to store waste paper and the staff to sort it, as well as a means of disposing of waste paper that cannot be used. Removing ink from waste paper also requires special chemicals, equipment, and equipment operators. As a result, some paper mills are not set up to use any recycled materials, while others prefer to use virgin materials as much as possible.

Not all paper products can be made with recycled paper. Brown grocery bags, for example, can be recycled into other types of paper, but they must be made, at least partially, out of virgin materials because only virgin materials have the long unbroken fibers that give the bags their necessary strength. Unlike glass bottles and aluminum cans, which can be recycled an infinite number of times, paper cannot be recycled indefinitely. Each time it is

recycled, its quality degrades slightly because the fibers become more and more broken. At some point recycled paper has to be mixed with virgin material, and eventually after repeated uses, ends up in a landfill or and incinerator.

5.2.6 Others Issues and Findings

A challenge for the local paper industry is to be able to supply the country's requirement in the production of paper. However, at this point of time, the local paper industry cannot compete with the quality of imported waste paper because of the kind of raw materials used in the country. Waste papers produced in the Philippines have shorter fibers because of the number of times they have been used. Imported waste paper usually originates from virgin pulp or with raw materials that have stronger and longer fibers.

According to a study done by Dr. Olivia Castillo of Asia Pacific Roundtable for Sustainable Consumption and Production, during mid-90's, 85% of raw materials for paper production in the Philippines are imported waste papers. However, in 2000, use of imported waste papers for paper production declined. Rising value of the US dollar leads to higher price of imported waste papers compared with local waste papers. Paper millers would then prefer to purchase local waste papers, which are much cheaper. For some paper millers and recyclers, imported waste paper is necessary in the production of their paper. These millers are usually those that produce good and high quality paper. For other millers or recyclers, if the local industry can supply enough waste papers, then they can use 100% local waste paper.

6. RECOMMENDATION

The following are recommendations proposed for an optimal strategy to increase recycling of paper:

6.1 Information and Education Campaign

The basic problem in the inefficiency of collection of waste paper is lack of education and information of consumers such as the households and business establishments. Most consumers are not aware of the benefits of segregating their wastes, not only of paper but

also of other recyclables such as bottles, plastics, metals, etc. One common misconception among consumers is that waste has no value.

Massive informational and educational campaign should be done at the barangay level. Private subdivisions should also be involved in the dissemination to its members. A good example is the information campaign conducted by the local government of Marikina City for its Solid Waste Management Program wherein the LGU went from barangay to barangay to disseminate information through flyers, brochures, and small talks.

6.2 Capability and institutional building

According to Amartya Sen, a nobel-prize winning economist, poverty is not only the deficiency in material or financial resources, but also the lack of capability and capacity. It is very important in the development and success of an industry. The strengthening of structures and systems in the life cycle of the paper industry will allow it to better respond to its concerns. It must network, collaborate, and partner with all stakeholders in mitigating the social, economic, and environmental problems.

Government has a key role in defining and supporting the paper recycling activities at the local/national level. The government should therefore strive to create policy frameworks that are beneficial to assisting other stakeholders.

6.3 Environmental Costing

Environmental costing or environmental accounting should be done in the whole infrastructure of paper recycling. Environmental accounting is a method of economic evaluation of environmental activities through the calculation of costs (expenditures) and benefits (earnings) derived from said environmental activities. Environmental accounting boosts cost awareness by assessing the economic benefits of environment. It shares a common recognition of the importance of sustainable development and use this to help spark environmental activities and increase their efficiency.

6.4 Other Tools and Approaches

In order to achieve increase in paper recycling in the Philippines, stakeholders should work out of the box, meaning, try new approaches and solutions to grow and develop and focus on one common goal. A good example is use of the triple bottom line (social, economic, environment) approach and doing it in an integrated method.

6.5 Planning and Looking Ahead

Like in achieving Sustainable Consumption and Production, it is not trying to reach a certain “critical mass” of activities but is rather trying to identify the most important issues to address and the key tools to address these issues with.

Paper recycling has to be perceived as one of the relevant priorities to the stakeholders. Because of this, the structure, flow of paper recycling needs to be researched and developed. Specifically, the links to economic development and other top priorities of local stakeholders should be emphasized and demonstrated through research, case studies or projects.

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Illuminada Teves, Carpel Trading Inc.

Vanessa Rafael, NVJ Paper Dealer

Ricky Chua, Ricky's JunkShop, T.Sora, Quezon City

Roberto Palibutan, Junkshop, Kamias Rd., Quezon City

Evelyn Macapagal, M& E Paper Dealer

Mang Boy, Boy's Junkshop, Commonwealth, Quezon City

Donato Gonzales, Expressions Book Store, Fairview, Quezon City

Ms. Yan-yan, Handyman Hardware

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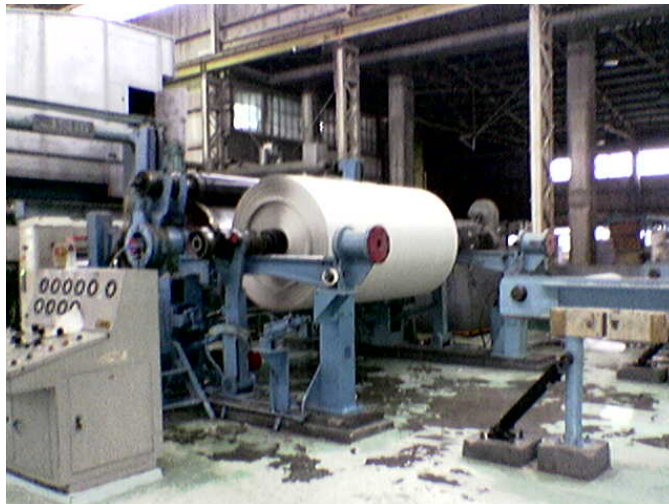
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ANNEX

PHOTOS



Noah Paper Mills - Waste Papers ready for processing



Machines in Paper Production



Finished Rolls of Paper



Interview with Ms. Geronima Domingo of Noah Paper Mills



One of the plants in the Paper City: Globe Paper Mills



Finished products of Globe Paper Mills



Interview with Carlos Uy of Globe Paper Mill

CARPEL TRADING CORPORATION



Collected waste papers





Mrs. Teves of Cappel Trading

LINIS GANDA OFFICE

