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REVITALIZING THE
PHILIPPINE RECYCLING INDUSTRY:
**A VIABLE STRATEGY
FOR SOLID WASTE
MANAGEMENT**



REVITALIZING THE PHILIPPINE RECYCLING INDUSTRY: A VIABLE STRATEGY FOR SOLID WASTE MANAGEMENT

RECYCLING INDUSTRY

Recycling is a process of using waste materials for new products. It is an essential step in dealing with plastic waste leakage. In 2016, there are around 23 operating plastic recycling plants in the Philippines with a combined capacity of roughly 6,000 tons of recyclable waste monthly. Plastic is the most discarded waste among households, yet one of the least segregated for waste collection.

In 2008, the Supreme Court (SC) issued a mandamus order directing 13 government agencies to clean up, rehabilitate and preserve Manila Bay, and to restore and maintain its water to SB level. The latter pertains to coastal and marine waters suitable for recreational use, i.e., bathing, swimming, and other activities. A decade after, coastal clean-up activities and rehabilitation efforts are still on-going although they have received renewed interest from the public and environmental groups following the rehabilitation of Boracay and listed as the third-largest source of plastic waste leakage in 2015.

Member organizations of the Break Free from Plastic movement conducted a brand audit of plastic pollution in Manila Bay in 2018 and identified that more than 50 percent of waste collected was plastic. Non-recyclable materials dominated the most substantial volume of collected waste, i.e. cigarette butts, textiles, diapers, sanitary napkins, many of the plastic packaging collected are those easily recyclable, i.e. polystyrene (PS) such as toys, hard packaging, and polyethylene terephthalate (PET) such as soft drink bottles, mineral water, fruit juice containers, among others, only if proper systems are in place. While the solution to the Manila Bay problem is complex and

does revolve around plastic waste pollution, it is inevitably a first and necessary measure to ensure the sustainability of all of these clean-up and rehabilitation efforts.

In Albert del Rosario Institute's (ADRI) Occasional Paper, entitled, "A Balanced Approach to Solid Waste Management: Governance and Total Stakeholder Participation," it was discussed that sustainable production systems, efficient waste management systems, adequately implemented and clearly defined regulations are as relevant and critical as responsible consumer behavior and must be integrated into a circular economy of waste. It answered what and why we have this problem.

In this issue, we now want to delve into possible integrated, large-scale, and nationwide solutions to address plastic waste leakage, especially if many of collected and uncollected waste is recyclable and hence, solvable. What would be the role of a recycling system in a circular economy of waste in the Philippines, and its impact on the efforts of addressing plastic waste leakage and overall plastic pollution in the Philippines?

* THE VIEWS AND OPINIONS EXPRESSED IN THIS PAPER ARE THOSE OF THE AUTHOR AND DO NOT NECESSARILY REFLECT THOSE OF THE INSTITUTE.

TABLE 1. LIST OF PLASTIC RECYCLING COMPANIES IN THE PHILIPPINES

| CITY/LOCATION | NAME OF COMPANY |
|--------------------------------|---|
| Valenzuela City, Metro Manila | 1. Asiano Industries 2. Ecoplast Industries 3. E-Friend Trading Corp. 4. Excellent Plastic 5. Filco Plastic 6. Marulas Industrial Corporation 7. MCS Plastic 8. Moonstar Plastic 9. National Plastic 10. New Ace Master 11. Pro-Earth Plastic 12. R.A. Plastic Corp. 13. Top Fine Plastic Mfg. Corp. 14. Valenzuela Pelletized Plastic |
| Caloocan City, Metro Manila | 1. Asia-Plas Industries Corp. |
| Mandaluyong City, Metro Manila | 1. Beverage Packaging Specialists, Inc. |
| Quezon City, Metro Manila | 1. Metal Wealth Enterprises Co. |
| Muntinlupa City, Metro Manila | 2. PEMA Plastic Mfg. Corp. |
| Manila City, Metro Manila | 1. Now Trading Concepts |
| Paranaque City | 1. Philippine Polystyrene Recycling Corporation |
| Mandaue City, Cebu | 2. San Miguel Manila Plastics Plant |
| | 1. Seacom Waste Management and Recycling Corp. |
| | 1. San Miguel Mandaue Plastics Plant |

SOURCE: EMB (AS OF 2016)¹

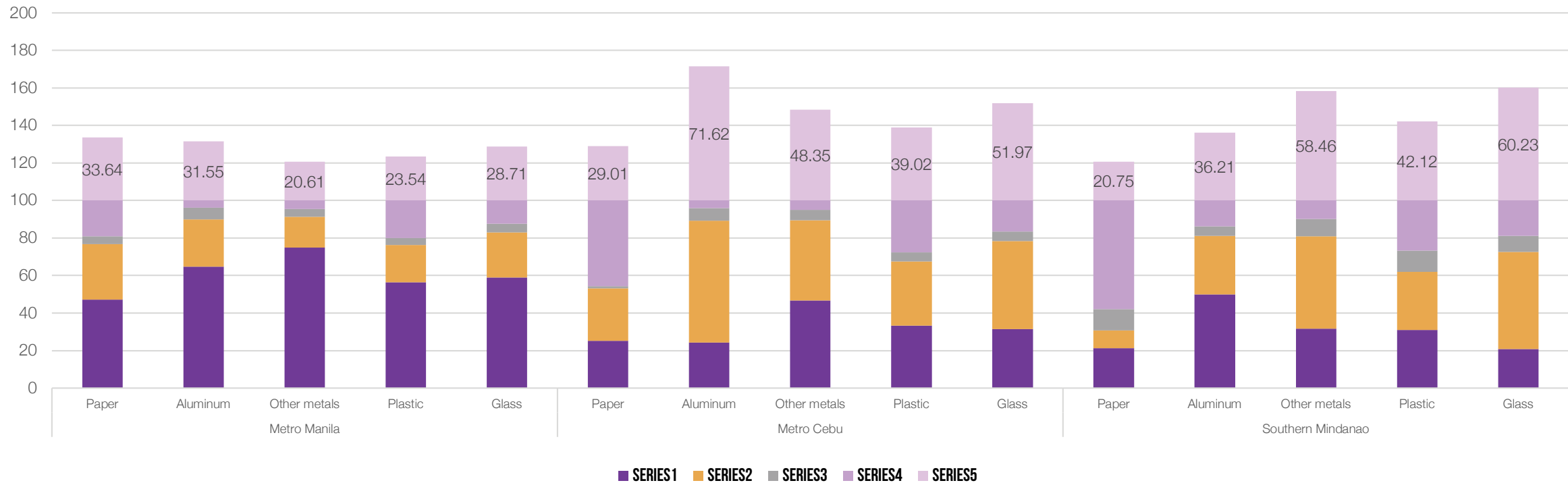
AN OVERVIEW OF THE PHILIPPINE RECYCLING INDUSTRY

Recycling, a process of using waste materials for new products, is an essential step in dealing with plastic waste leakage. (ADRI, 2018) According to the Environmental Management Bureau (EMB)

in 2016, there are around 23 operating plastic recycling plants in the Philippines with a combined capacity of roughly 6,000 tons of recyclable waste monthly.¹ Most of these recycling companies² are

in Metro Manila, i.e. Valenzuela, Caloocan, Paranaque, Mandaluyong, Quezon City, and Manila, and one in Cebu.

FIGURE 1 . SEGREGATION OF RECYCLABLE MATERIALS IN HOUSEHOLDS



Notes:
1. Series 1: Discarding into waste bin for municipal waste collection
2. Series 2: Sell or give to door-to-door collector
3. Series 3: Bring to recycling centers
4. Others

SOURCE: JICA (2008)

A 2008 study by the Japan International Cooperation Agency (JICA)³ showed that plastic is the most discarded waste among households, yet one of the least segregated for waste collection. This case is most apparent in households in Metro Manila.

However, the ratio of separating recyclable materials among business entities in Metro Manila is higher than those in Metro Cebu and Southern Mindanao. It may reflect higher awareness of recycling in business entities, or consumption of plastic materials though it can still be improved.⁴

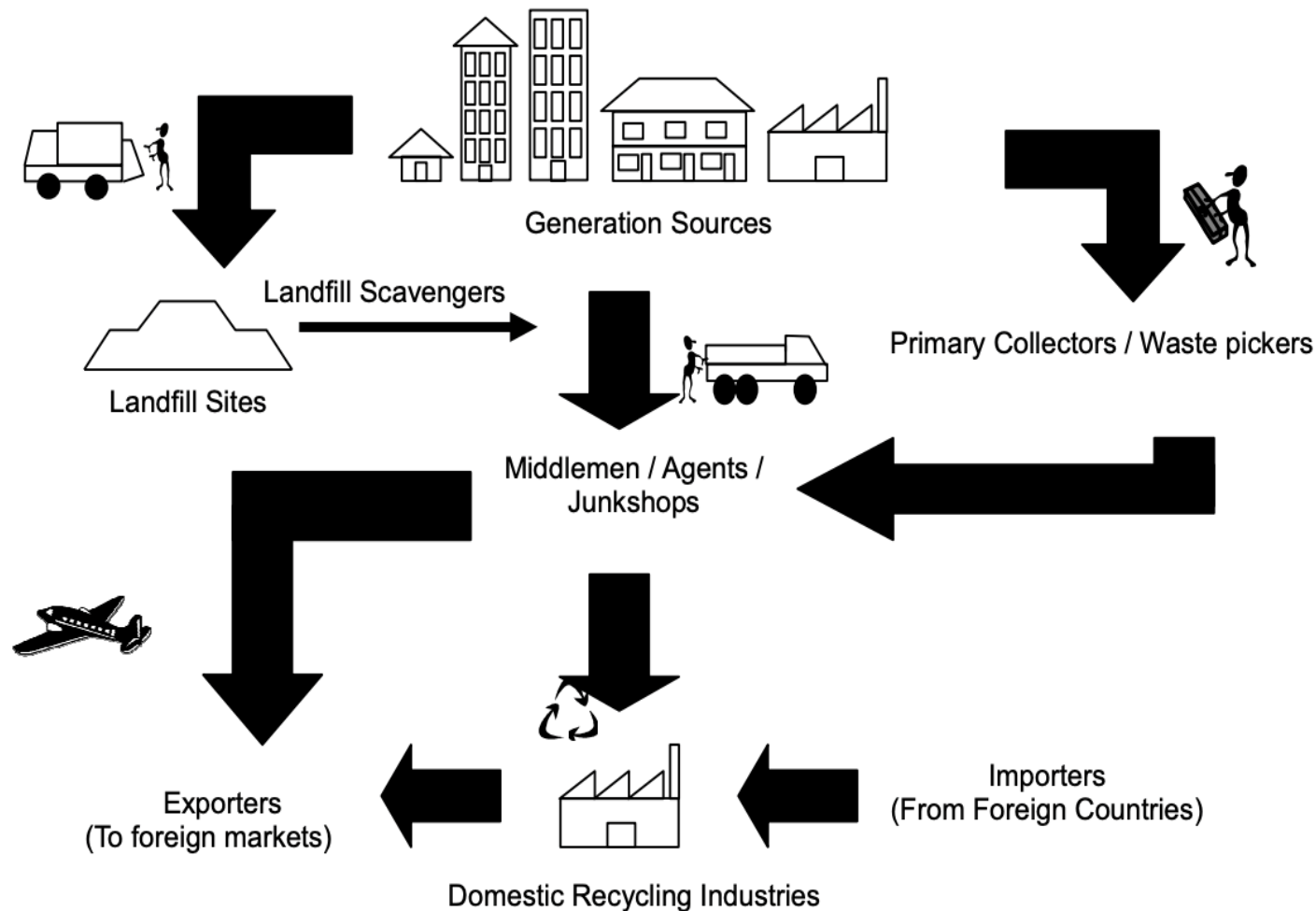
Recycling is among the preferred options in the waste management hierarchy, of which direct responsibility lies with generation sources, e.g. households, institutional and commercial establishments, barangays, and municipalities/cities.⁵ Other stakeholders have significant roles to play for a functioning and seamless recycling industry.

TABLE 2. RESPONSIBILITY OF STAKEHOLDERS FOR RECYCLING

| STAKEHOLDER | ROLES AND RESPONSIBILITY |
|--|--|
| National Solid Waste Management Commission | <ul style="list-style-type: none">• Encourage national and local agencies and organizations to purchase environmentally preferable products and services• Prepare a list of non-environmentally acceptable products and make it available to the public through the solid waste management information database• Establish procedures, standards and strategies to market recyclable materials and develop the local market for recycled goods |
| National Ecology Center | <ul style="list-style-type: none">• Assist LGUs in establishing and implementing deposit or reclamation programs in coordination with manufacturers, recyclers and generators to provide separate collection systems or convenient drop-off locations for recyclable materials and particularly for separated toxic components of the waste stream like dry cell batteries and tires to ensure that they are not incinerated or disposed of in a landfill<ul style="list-style-type: none">○ Conduct a detailed study on feasible reclamation programs and buyback centers○ Cooperate with respective LGUs in the formulation of related ordinances |

| STAKEHOLDER | ROLES AND RESPONSIBILITY |
|--|--|
| Department of Trade and Industry | <ul style="list-style-type: none">• Publish a study of existing markets for processing and purchasing recyclable materials and the potential steps necessary to expand these markets• Conduct a study into product standards for recyclable and recycled materials and provide the results of the study and any subsequent guidelines or standards formulated to the public through the NEC database · Formulate and implement a coding system for packaging materials and products to facilitate waste recycling and re-use based on ISO 14024 (Bureau of Product Standards) |
| Department of Agriculture | <ul style="list-style-type: none">• Publish and annually update an inventory of existing markets and demands for composts• Assist compost producers to ensure that compost products conform to fertilizer standards set by DA |
| Local Government Units (LGUs) | <ul style="list-style-type: none">• Arrange for long-term contracts to purchase substantial share of the product output of the facility that produces goods from post-consumer and recovered materials generated in the jurisdiction of the LGU whenever appropriate |
| Barangay | <ul style="list-style-type: none">• Collect, segregate, and recycle biodegradable, recyclable, compostable and reusable wastes ·• Establish Materials Recovery Facility (MRF) (by one or cluster of Barangays) |
| Household, institutional, industrial, commercial, and agricultural sources | <ul style="list-style-type: none">• Sort and segregate biodegradable and non-biodegradable wastes |

SOURCE: JICA (2008)

FIGURE 2. RECYCLING PROCESS IN THE PHILIPPINES

SOURCE: JICA (2008)

The prevailing documented practice is that waste segregation begins at the household level, and formally collected by garbage trucks. Some areas are not reached by garbage trucks, and thus waste end up being collected by informal collector or scavengers. Waste collected by the formal collection system, ideally goes through the materials recovery system (MRF) where waste is further sorted, segregated, composted, and recycled. Residual wastes are thereafter brought to sanitary landfills. (see Figure 2)

Of course, not all LGUs have complied or are equipped with having an MRF, which means unsegregated waste is brought to landfills where they are (ideally) sorted out. Informal waste collectors, which dominate the waste management system, sort these out and brought to junk shops which in turn pay a sum to the collectors. According to Ocean Conservancy (2017), waste-picking takes place in four distinct points:

1. "Pre-collection at the household or street level;
2. During the hauling process, with waste pickers extracting waste while riding on trucks as they move;
3. At material-recovery facilities (MRFs), with waste pickers providing the human engine behind what is essentially an entirely manual system in most of the Philippines;
4. At the landfill or dumpsite"⁶

Based on the report, the second and third points are the most profitable for these waste collectors. These junk shops then bring recyclable materials to recycling centers which are responsible for the segregation and primary cleaning. These materials are then exported to manufacturers. Some recycling centers also clean, grind, and pelletize recycled plastic before exported to manufacturers. JICA (2008) notes that junk shops are the receivers of recyclable materials from primary collectors, and at the same time, traders to consolidators or final users of the products. Consolidators also sometimes receive recyclable waste from factories, commercial facilities, and office buildings, or even from primary

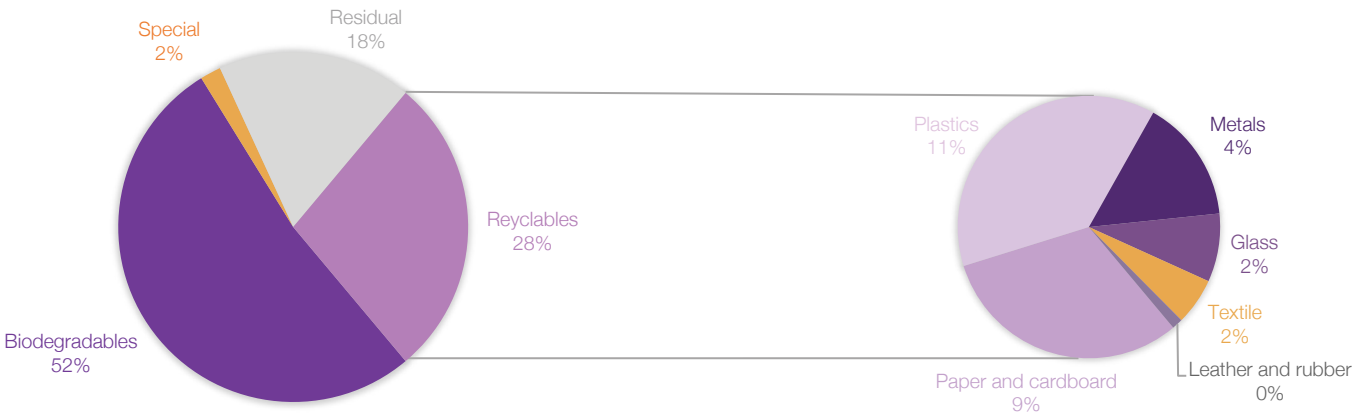
waste collectors, making them the most prominent traders of recyclable materials. They are also responsible for the importation and exportation of recyclable materials. (see Figure 2)

The presence of a recycling industry is mandated under the Ecological Solid Waste Management Act (RA 9003) which requires diverting at least 25 percent of all solid waste from waste disposal facilities through re-use, recycling, composting, and other resource recovery activities. It is also elaborated that an incentive scheme, through fiscal and non-fiscal incentives, must be designed to encourage LGUs, private entities, and even non-government organizations (NGOs) to develop or undertake effective solid waste management (SWM) which includes a Recycling Market Development.ⁱⁱ

While recycling systems are already in place, it may not be as efficient and adequate for the amount of plastic waste that is generated by households, commercial and industries establishments, and other institutional entities. According to EMB’s latest SWM Report,⁷ biodegradable or compostable waste has the most significant share of municipal solid waste in the Philippines at 52 percent. This is followed by recyclable waste at 28 percent, residual waste at 18 percent, and special waste at 2 percent. Most recyclables are classified to be plastic. (see Figure 3)

With that assumption, we can roughly calculate for the share of recyclable waste and recyclable waste from projected waste generation in ADRI’s Occasional Paper, entitled, “A Balanced Approach to Solid Waste Management: Governance and Total Stakeholder Participation.”⁸ The National Capital Region, the country’s most urbanized area and highest projected waste generation, also has the most substantial share of plastic waste. Aside from the number of plastic reduction policies, this may also explain why many of the plastic recycling companies are in the metro. (see Table 3)

FIGURE 3 . COMPOSITION OF MUNICIPAL SOLID WASTE IN THE PHILIPPINES



SOURCE: EMB (2016)

TABLE 3. ESTIMATED RECYCLABLE WASTE AND RECYCLABLE PLASTIC WASTE FROM PROJECTED WASTE GENERATION

| REGION | PROJECTED WASTE GENERATION | | ESTIMATED % OF RECYCLABLE WASTE | | ESTIMATED % OF RECYCLABLE PLASTIC WASTE | |
|-------------|----------------------------|------------|---------------------------------|------------|---|-----------|
| | 2019 | 2020 | 2019 | 2020 | 2019 | 2020 |
| NCR | 9,696,050 | 9,874,457 | 2,133,131 | 2,172,381 | 234,644 | 238,962 |
| CAR | 1,111,372 | 1,131,821 | 244,502 | 249,001 | 26,895 | 27,390 |
| I | 3,243,832 | 3,303,519 | 713,643 | 726,774 | 78,501 | 79,945 |
| II | 2,227,519 | 2,268,505 | 490,054 | 499,071 | 53,906 | 54,898 |
| III | 7,240,142 | 7,373,361 | 1,592,831 | 1,622,139 | 175,211 | 178,435 |
| IV-A | 9,303,206 | 9,474,385 | 2,046,705 | 2,084,365 | 225,138 | 229,280 |
| IV-B | 1,912,534 | 1,947,725 | 420,758 | 428,499 | 46,283 | 47,135 |
| V | 3,741,341 | 3,810,182 | 823,095 | 838,240 | 90,540 | 92,206 |
| VI | 2,889,588 | 2,942,756 | 635,709 | 647,406 | 69,928 | 71,215 |
| VII | 3,899,407 | 3,971,156 | 857,870 | 873,654 | 94,366 | 96,102 |
| VIII | 2,865,645 | 2,918,373 | 630,442 | 642,042 | 69,349 | 70,625 |
| IX | 2,342,640 | 2,385,744 | 515,381 | 524,864 | 56,692 | 57,735 |
| X | 3,026,447 | 3,082,133 | 665,818 | 678,069 | 73,240 | 74,588 |
| XI | 3,158,117 | 3,216,227 | 694,786 | 707,570 | 76,426 | 77,833 |
| XII | 2,933,493 | 2,987,469 | 645,368 | 657,243 | 70,991 | 72,297 |
| ARMM | 2,440,484 | 2,485,389 | 536,906 | 546,786 | 59,060 | 60,146 |
| XIII | 1,675,900 | 1,706,737 | 368,698 | 375,482 | 40,557 | 41,303 |
| PHILIPPINES | 65,172,797 | 66,371,976 | 14,338,015 | 14,601,835 | 1,577,182 | 1,606,202 |

Assumptions:
1. Projected waste generation was taken from A Balanced Approach to Solid Waste Management: Governance and Total Stakeholder Participation (ADRI, 2018)
2. Estimated share of recyclable waste is taken as constant across all regions at 22% based on updated SWM report

3. Estimated share of recyclable plastic waste is taken as constant across all regions at 11% based on updated SWM report
4. The calculations do not take into consideration whether recyclable waste and recyclable plastic waste are collected or uncollected.

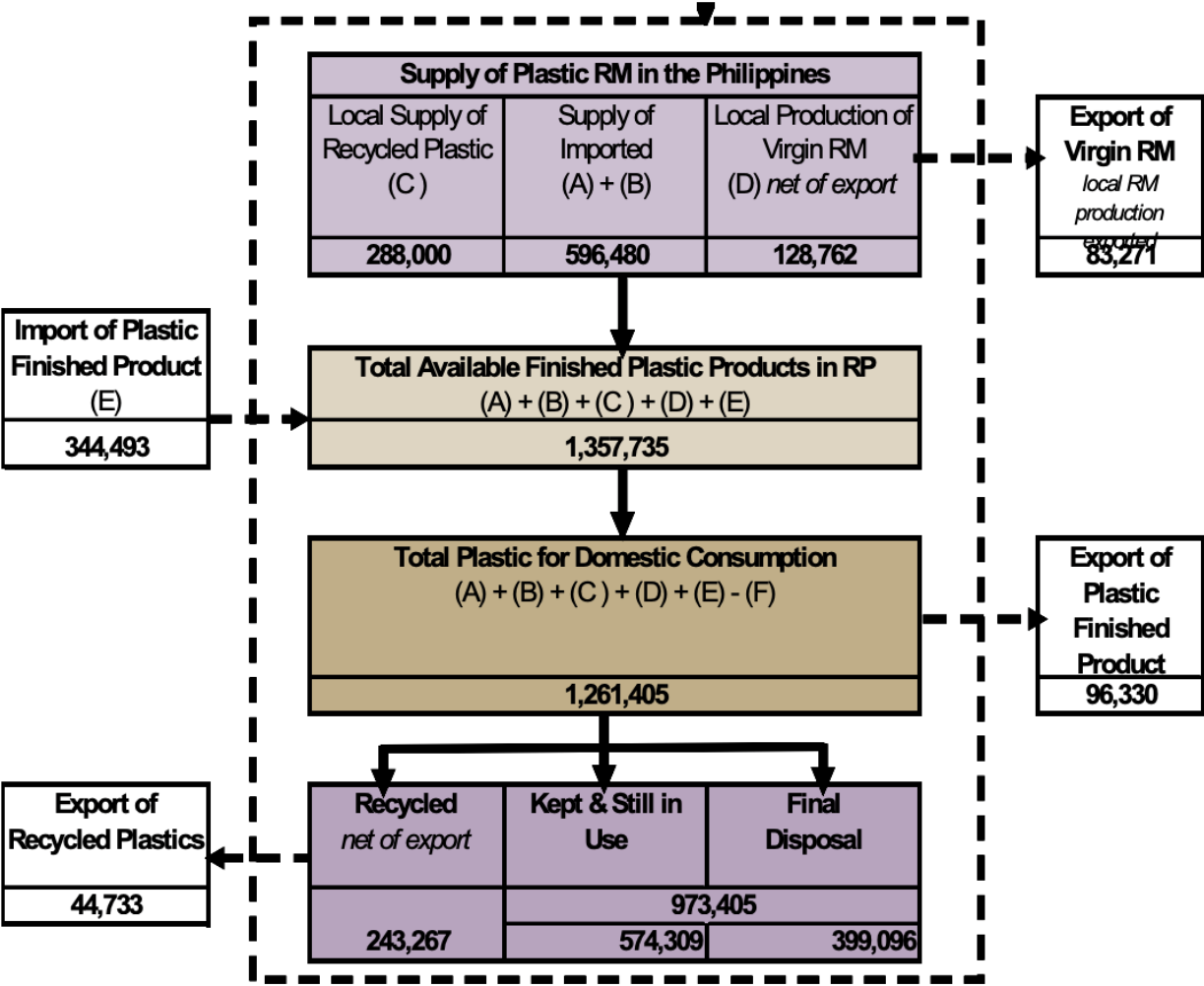
SOURCE: JICA (2008)

However, this hardly reconciles with the amount of plastic processed by recycling facilities in the country at 6,000 MT/month (or 72,000 MT/annually), based on an EMB presentation.⁹ In an earlier study conducted by JICA, it was noted that the local supply of recycled plastic paled in comparison to the amount of imported plastic in terms of plastic consumption. There were also less exported recycled plastic materials than raw plastic waste and those in landfills.

While the amount of recyclable waste and plastic wastes cannot be definitively concluded given pure estimates from several years ago, this flags how waste may be ineffectively segregated at the household level, further sorted out in MRFs (if at all present) and brought all the way to recycling centers. According to JICA (2008), “proper separation of recyclable materials at the sources of generation is the fundamental key to their efficient collection and utilization through material recycling.”¹⁰ Most importantly, this reveals that there is a missed opportunity in plastic recycling. If the country is able to process more recycled plastics internally, these materials can be exported at higher values than scrap plastic, lessen the dependency for more import plastics, and even ease plastic waste leakage. To wit, the number of recyclable plastic waste pales in comparison to the amount of plastic waste leakage at 386,000 tons (equivalent to 17 percent) of collected waste and 135,000 tons (equivalent to 31 percent) of uncollected waste.¹¹ This is evident that the current waste management infrastructure and systems have failed to keep up to what could have been an avoidable problem. Even with current plastic consumption, underdeveloped collection system, and outdated and unenforced regulations – all critical nodal points of SWM - are not enough to manage plastic waste leakage.¹²

In economics, accelerated productivity is led by changes in technology. Given the massive task of cleaning up accumulated plastic waste to processing what is generated, and reducing plastic waste, perhaps there is a need for more large-scale and advanced recycling facilities in the Philippines to help plug the hole and clear the way.

FIGURE 4. ESTIMATED MATERIAL FLOW OF PLASTICS



SOURCE: JICA (2008)

TABLE 4 . PRICE OF PLASTIC RECYCLABLES¹³

| RECYCLABLE ITEMS | JUNK SHOP (PHP/KILO) | FACTORY (PHP/KILO) |
|--|----------------------|--------------------|
| PET bottle, clean w/o caps & labels; unclean w/cps & labels | 16 | 20 |
| | 12 | 15 |
| Plastic (sibakin) HDPE | 10 | 13 |
| Plastic LDPE | 5 | 10 |
| Engineering plastics | 10 | 13 |
| Old diskette | 8 | 10 |
| Ink jet cartridge | 100-300 | |
| Zesto packaging | 0.20/pc | |

SOURCE: EMB (2016)

TABLE 5 . TIME NEEDED TO COLLECT DIFFERENT WASTES, AND CORRESPONDING PRICE AND DAILY WAGE

| TYPE OF WASTE | TIME NEEDED TO COLLECT 1 KILOGRAM OF WASTE (MINUTES) | PRICE PAID/KILOGRAM \$ | DAY'S ' WAGES \$ | COLLECTION RATE |
|-------------------|--|---------------------------|---------------------|-----------------|
| Plastic bag | 61 | .05 | 0.5 | Low |
| PP ² | 37 | .12 | 2.0 | Low |
| PET ³ | 37 | .23 | 3.7 | High |
| HDPE ⁴ | 21 | .16 | 4.6 | Low |

¹Assuming 10-hour collection day of waste type specified;

²Polypropylene;

³Polyethylene terephthalate;

⁴Not all high-density-polythylene products will fetch the same price at a junk shop or be easily recognizable by waste pickers.

SOURCE: OCEAN CONSERVANCY (2017) AND STAFF ESTIMATES

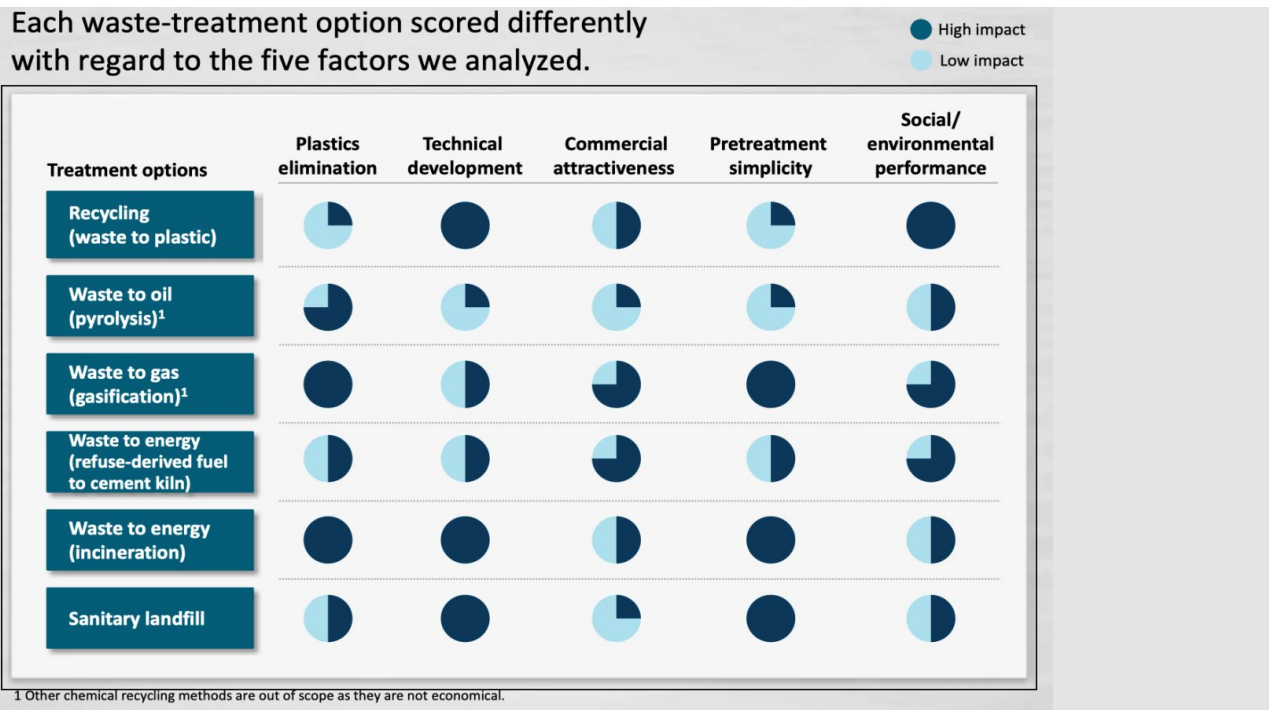
REVITALIZING THE PHILIPPINE RECYCLING INDUSTRY

Segregation of recyclable materials, such as plastic waste, in the Philippines is strongly dependent on their monetary value in the market. Given the current state of the waste management system, this explains why a large volume of recyclables collected is dominated by an informal recycling system or by waste pickers. Plastic materials, particularly PET bottles, have one of the highest values among the recyclable waste.

On one hand, this is what makes recycling an attractive investment venture. There is an existing stream of recyclable materials and labor to tap. On the other hand, this informal system also contributes to addressing plastic waste leakage as they cover uncollected waste in areas not reached by formal SWM systems. Once waste is in the collection system, “they are less likely to be leaked into the ocean.”¹⁴ However, given the opportunity cost of collecting different values of plastic materials, higher value PET bottles are mostly collected, while low-value residuals (e.g. plastic bags, sachets) are left behind. The report furthers that 80 percent¹⁵ of plastic waste has a low residual value and make up a large percentage in disposal facilities where a significant amount of leakage originates. Meanwhile, PET extraction of waste pickers is at 90 percent, according to the Ocean Conservancy report (2017).

Building more large-scale recycling facilities is in line with the report’s short-term development strategy of reducing plastic waste leakage by 50 percent. Compared to a sanitary landfill, it has a higher impact with respect to technical development and social and environmental performance. Recycling creates employment and income opportunities for those engaged in both formal and informal collection, widespread reduction of plastic recyclables and even residuals in the waste stream and supports related industries such as waste-to-energy plants. Recycling is an alternative process of getting back the energy used in producing plastic materials, and instead, used to produce other products.¹⁶ Not to mention, recycling lessens the burden on sanitary landfills where many of the recyclable waste end up.

FIGURE 5 . EVALUATION OF WASTE TREATMENT OPTIONS



SOURCE: OCEAN CONSERVANCY (2017)

There is already an existing recycling industry in the country and now, it just needs to be upscaled. However, before any investment is made, quality collection infrastructure must be improved and accelerated, and gaps post-collection leakage (i.e. open dumpsites, etc.) are avoided to maximize collection capacity. Ocean Conservancy (2018) suggests that leakage points within the system must be closed such as putting a stop to the open dumping practices and addressing collection of underserved areas. The report also recommends integrating waste pickers in the redesign of the

formal collection system, which goes hand-in-hand with establishing more recycling centers and facilities all over the country that can take on these recyclable plastic wastes. Effectively, the latter ensures “availability of sufficient waste feedstock to support waste treatment at scale” including recycling facilities. After all, recycling options are only commercially viable if “collection levels are high enough to guarantee a consistent supply of sufficient raw materials.”¹⁷ There is roughly 16 percent¹⁸ of uncollected plastic waste which may leak out to the ocean

or littered. Further, an improved collection system will only be as effective if there is proper segregation. While sorting mixed plastic waste is difficult, given the different composition and types, contamination may happen. This may compromise its re-use to other applications. This is why there is only a small contribution of recycling to plastic consumption.¹⁹

One of the more prominent projects is the residual plastic recycling facility in Paranaque by the Philippine Alliance for Recycling and Materials Sustainability (PARMS), in partnership with the local government. PARMS is an alliance of major corporations and business groups in the Philippines such as Mondelez Philippines, Coca-Cola FEMSA Philippines, Liwayway Marketing Corporation, Pepsi-Cola Products Philippines, Unilever, Universal Robina Corporation, Nestlé Philippines, Monde Nissin Corporation, Procter & Gamble Philippines, Philippine Chamber of Commerce and Industry, and the Philippine Plastics Industry Association. It has been reported that they already started collecting plastic waste from several schools in the city. Collected waste is turned into eco-bricks or recycled building bricks, which are also used to improve the schools’ facilities.²⁰

Further, Coca-Cola Philippines just recently announced plans to build a PHP 1 billion state-of-the-art food-grade recycling facility that will transform used recyclable PET plastic bottles back into new and useful beverage bottles again. Now, this recycling facility will collect, sort, clean, and wash post-consumer recyclable plastic bottles and turn them into new bottles and bring it back into the value chain. Anchored on a circular economy model of waste, this move aims to transform the way recyclable packaging is seen from a “use once and dispose after” item to institutionalize a loop that makes it a valuable resource. This is the company’s first major investment in a recycling facility in Southeast Asia.

As presented in this paper, a successful recycling facility is only viable if there is an assured supply of collected recyclable materials. This is why gaps in the collection system need to be addressed. Public and citizen-led programs have also been implemented over the years, which can be integrated into the design of seamless recycling industry in the country.

In 2004, Marikina City introduced a school-based recycling program in the Eco-savers program,²¹ which provided junk shops in the city with a regular supply of recyclable materials. The program required students to bring recyclable garbage from their households during an

assigned Eco Day wherein garbage is weighed, valued, and credited by accredited junkshops to their issued eco passbooks. Accredited junk shops haul all the recyclables collected. The points entitle the eco-saver to shop in the Eco-Savers Mobile Store, which carries educational materials such as dictionaries, books, school supplies, and educational toys. Further, from 2004 to 2012, it was able to save 284,713.4 gallons of oil, and 2,111,866.84 kWh of energy from recycling plastic. This is replicated in other parts in Southeast Asia.

In 2015, Barangay Potrero in Malabon implemented a new waste management program which replaced garbage trucks with a

women-led committee called the Ladies Brigade Committee.²² Many households in the area are not accessible to garbage trucks due to narrow or lack of roads. This resulted to waste ending up on road or rivers. The latter was previously assigned to handle the barangay’s daycare center, health care services, and information campaigns. The group hired waste collectors who were either informal waste or formal waste pickers in the community to undertake a door-to-door collection system for households excluded from truck routes. They are now able to receive regular monthly salaries and social benefits (e.g. medical assistance, life insurance, etc.) to reduce risks of an unsafe working environment; and keep earnings from the recyclables they collect in addition to their wages.

TABLE 6. SUMMARY OF EXISTING ECONOMIC INCENTIVES FOR THE IMPLEMENTATION OF RA 9003²³

| NAME OF INCENTIVE | RESPONSIBLE ORGANIZATION |
|---|-------------------------------------|
| Fiscal Incentive <ul style="list-style-type: none">Income Tax HolidayDuty Reduction on Imported Capital Equipment, Spare Parts, and AccessoriesTax Credit on Raw Materials and Supplies | Board of Investments |
| Non-fiscal incentives <ul style="list-style-type: none">Simplification of Customs ProceduresUnrestricted Use of Consigned EquipmentEmployment of Foreign Nationals | Board of Investments |
| Financial assistance programs <ul style="list-style-type: none">Environmental Lending Program | Development Bank of the Philippines |
| <ul style="list-style-type: none">Countryside Lending Fund | Land Bank of the Philippines |

SOURCE: JICA (2008)

An incentive scheme is provided for under RA 9003 to encourage LGUs, enterprises, private entities, or NGOs to develop or undertake an effective SWM. Incentives to promote recycling include (1) fiscal incentives such as tax/duty exemption and tax credit, (2) non-fiscal incentives such as simplified procedures for the importation of equipment, and (3) financial assistance programs by government financial institutions such as the Development Bank of the Philippines and Land Bank of the Philippines (LBP).

Aside from these incentives and assistance, it is also the mandate of the National Solid Waste Management, together with the National Ecology Center, Department of Trade and Industry and Department of Finance, to ensure guarantees by the “national and local governments to purchase a percentage of the facility’s output; and maintaining a list of prospective buyers, establishing contact with prospective buyers and reviewing and making any necessary changes in collecting or processing the materials to improve their marketability.”ⁱⁱⁱ LGUs may partner with private entities that locate in their area to purchase the latter’s finished products from post-consumer and recovered materials.

CONCLUSIONS AND RECOMMENDATIONS

Recycling is a commercially attractive waste treatment practice in the Philippines and is a viable land-based strategy to address plastic waste leakage. Revitalizing the industry means providing employment and livelihood opportunities for communities while reducing traffic congestion and air pollution, contributing to energy conversion, and also supporting secondary industries such as RE development, textiles, cement, among others. It is also more environmentally sustainable as it raises the opportunity cost of delivering waste to sanitary landfills.

However, promoting the recycling industry is a broad-based approach needing streamlined essential strategies, and participation of all stakeholders – households, establishments, waste-pickers, small-scale recycling centers, private partners, LGUs, and national agencies – to create a seamless and efficient industry.

1. *Close the gap in the collection system.* We need to improve our SWM system, starting with closing the gap wherein plastic leakage occurs and exploring other strategies to expand collection in underserved areas. There are school-based recycling programs that are being implemented in Marikina and Paranaque that can be replicated to improve collection rates and boost supply of recyclable plastic materials, and as a result, incentivize more recycling centers. More informal waste collectors can be integrated into the redesign of a recycling industry to augment collection gaps in underserved areas, especially in more urban communities to support operations of large-scale recycling plants.

2. *Regulate the monitoring of waste segregation practices among households and other establishments.* As argued in ADRI's "A Balanced Approach to Solid Waste Management: Governance and Total Stakeholder Participation," significant reduction in plastic-waste leakage will only be possible with public acceptance and engagement.ⁱ Policy interventions need to be reassessed in terms of their applicability in strategic locations – low, medium, and high-density areas. The

government needs to show that it can effectively implement regulations, monitor violations, follow through cases and complaints, and impose sanctions. Shaping consumer behavior through information and education campaigns must be undertaken alongside these efforts.

3. *Ensuring ease of doing business.* Government has a crucial role in revitalizing the industry and does not end with providing incentives and assistance to big corporations but to small-scale centers and facilities as well. The recycling industry is like any other business operations that need clear, strategic, and well-placed plans and policies to be productive, generate employment and livelihood opportunities for communities, and contribute to broad-based and long-term growth.

Recycling of plastic is just one of the key components of an effective waste management system, but it should not end there. While headways are evident for more industry and public-led efforts of sustainable packaging and reduction and avoidance of plastic consumption, there is still a long way to go. A short-term and effective strategy is to improve waste management infrastructure, incentivize waste collectors, establish more strategically located MRFs and large-scale recycling plants that can go hand-in-hand in recovering plastic in the waste stream, reduce landfill dependence, and contribute to addressing plastic-waste leakage.

In the case of Manila Bay, the success of its coastal strategy is not just about solid waste management but an interwoven cluster of components such as liquid waste management, resettlement of informal settler families along the waterways of the bay area and disciplined consumer behavior, monitoring and compliance of LGUs, households, and commercial and industrial establishments to environmental codes and waste infrastructure. Clean up, recovery and recycling may be crucial to jumpstarting the process and curbing discarded and unmanaged plastic waste, but this is only a fraction of a bigger process.

ⁱ As of August 2019, the Department of Environment and Natural Resources is finalizing the list of recycling companies and will be released before the year ends.

ⁱⁱ See Article 4 of RA 9003

ⁱⁱⁱ See RA 9003

ENDNOTES

¹ Environmental Management Bureau. (2016). Recycling practices in the Philippines. Retrieved from: <http://nswmc.emb.gov.ph/wp-content/uploads/2016/06/6.recycling-practices.pdf>

² EMB. (2016). Directory of recycling companies. Retrieved from: http://nswmc.emb.gov.ph/wp-content/uploads/2016/06/LIST_OF_RECYCLERS__REVISED_.pdf

³ Japan International Cooperation Agency. (2008). The study on recycling industry development in the Republic of Philippines. Retrieved from: http://nswmc.emb.gov.ph/wp-content/uploads/2018/03/Summary-of-Final-Report-_complete_.pdf

⁴ Ibid.

⁵ National Solid Waste Management Commission. (2016). National Solid Waste Management Commission 2012 – 2016. Retrieved from: <https://nswmc.emb.gov.ph/wp-content/uploads/2016/07/NSWM-Strategy-2012-2016.pdf>

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