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MASTER OF ASEAN STUDIES

ARNOLD LIM PASILLAS II

**A COMPARATIVE STUDY OF LAWS AND POLICIES ON PLASTIC WASTE
MANAGEMENT BETWEEN INDONESIA AND THE PHILIPPINES**

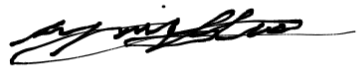
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A COMPARATIVE STUDY OF LAWS AND POLICIES ON PLASTIC WASTE MANAGEMENT BETWEEN INDONESIA AND THE PHILIPPINES

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This thesis of **ARNOLD LIM PASILLAS II** titled: “**A COMPARATIVE STUDY OF LAWS AND POLICIES ON PLASTIC WASTE MANAGEMENT BETWEEN INDONESIA AND THE PHILIPPINES**” is hereby accepted by the Faculty of Management and Development Studies, U.P. Open University, in partial fulfillment of the requirements for the degree Master of ASEAN Studies.


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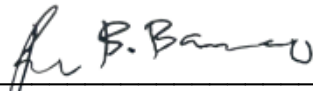
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Biographical Sketch

Arnold L. Pasillas II is a certified TEFL and TEYL educator with over 11 years of experience teaching English communication—both written and spoken—to international students. He holds a bachelor's degree in AB Communication Arts from Holy Angel University, Central Luzon's most populous university, where he was a two-time academic scholar and made the President's List on four occasions. His undergraduate years helped him refine his skills in public communication and cross-cultural engagement.

Driven by a broader interest in regional cooperation and public service, he pursued a Master's degree in ASEAN Studies, viewing it as a gateway to future government work—an ambition he realized through appointments in 2017 and 2020. Ultimately, he returned to his core passion: education, where he continues to work as a freelance English instructor for foreign learners.

His research into plastic pollution was inspired by personal experience—living near a heavily polluted river and stream in the Philippines. What began as a local concern evolved into a regional inquiry, driven by the belief that while plastic pollution is a complex and urgent issue, the solutions already exist; what remains lacking is the collective political and institutional will to implement them.

As a long-time LEGO enthusiast, he also envisions the potential for innovative circular solutions, such as transforming marine and landfill plastic waste into sustainable toy materials. With the Philippines home to a large and active LEGO fanbase, he sees this as a promising direction for future research and advocacy.

Acknowledgment

All glory be to God for without Him I can do nothing. John 15:5.

I would like to express my deepest gratitude to my adviser, Dr. Bagarinao, for his invaluable guidance, encouragement, and expertise throughout the course of this research. I am also sincerely thankful to my panel members, Dr. Habito and Mr. Borromeo, for their insightful inputs, constructive feedback, and support which greatly contributed to the development and refinement of this study.

Dedication

This research is dedicated to the people and leaders of Indonesia, the Philippines, and the broader ASEAN community, in the hope that the preservation of our environment remains a permanent and urgent priority on the national and regional agenda.

A century from now, we who live today will no longer be here. Yet the lands, seas, and skies we pass on will remain — shaped by the choices we make now. May this work serve as a small contribution toward a future where our children and theirs inherit not a planet in crisis, but one nurtured with care, vision, and responsibility.

May those who come after us walk a path made clearer by our efforts — a path that proves we acted not only in self-interest, but with deep regard for generations yet to be born. Let us leave behind not regret, but the legacy of having done what we could to protect and preserve the only home we share.

“When short-term solutions like recycling and clean-up campaigns become the primary focus, they risk becoming false solutions — distracting from systemic change and allowing the root causes of plastic pollution, particularly overproduction and weak regulation, to persist unchecked.”

— Arnold L. Pasillas II

Master of ASEAN Studies

June, 2025

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Abstract

This study presents a comparative analysis of plastic waste management laws, policies, and practices in Indonesia and the Philippines, two of Southeast Asia's most plastic-intensive economies. Grounded in five central pillars—policy and regulation, community capacity and management, technological innovation, partnerships and collaboration, and behavioral and cultural transformation—the research examines both institutional frameworks and community-level interventions to evaluate the effectiveness and limitations of current approaches. Through thematic qualitative analysis, the study identifies recurring implementation gaps linked to enforcement challenges, infrastructure limitations, and inconsistent public participation, despite the presence of comprehensive legal instruments such as Indonesia's National Plan of Action on Marine Debris and the Philippines' Ecological Solid Waste Management Act.

The findings culminate in a 10-point strategic framework designed to guide local and national decision-makers toward scalable, inclusive, and systems-oriented solutions. Key themes include the rise of hybrid waste management models blending technology with grassroots engagement, the evolving role of informal sectors, and the critical need for cross-sector alignment in achieving circular economy goals. The study underscores the importance of maintaining momentum in regulatory development while strengthening mechanisms for community integration, inter-agency coordination, and private sector engagement.

Beyond the national lens, this research contributes to the broader ASEAN agenda on environmental cooperation by offering context-specific insights and replicable practices that can support regional harmonization of plastic waste

strategies. Ultimately, it offers a timely reminder that meaningful progress in addressing plastic pollution requires not only policy commitment but sustained, multi-level alignment across institutional, societal, and market-driven actors.

Keywords: plastic waste management; behavioral transformation; circular economy; best practices; ASEAN

Chapter I

INTRODUCTION

Background of the Study

Plastic offers convenience, sanitation and hygiene. However, it can also denote environmental destruction. Plastic travels both points of the pendulum and exists in extremities – a benefit for the short-term and a bane for the long-term. Plastics are present in all aspects of human lives such that living without it is impossible. As time progressed, humans have geared themselves towards the expedience that plastics can offer. We have grown dependent to it. Anything we buy always comes with a plastic bag, it is convenient that when we aren't given one, we ask for it. The plastic bag is a small trivial thing, but it conveniently releases us from many inconveniences.

Though they offer ease to individuals, plastics is detrimental to both the environment and humanity. According to the Center for Biological Diversity (2019), the plastics that provide convenience to every user have an average usage time of 12 minutes and are easily disposed of into the environment creating diverse environmental problems.

The World Economic Forum in 2016 reported that single-use plastics will outweigh fish in all the oceans by 2050. This is possible because of the staggering eight (8) million metric tons of plastic leaking into the oceans from land each year and a massive 26% alone comes from single-use plastic, specifically, as packaging. In addition, Garcia et al. (2019) reported that the entry of plastic particles to the marine environment has posed a serious threat to marine ecosystems and human health because of its large scale complexities and the increasing consumption of

plastic both in developed and developing countries. *“This high-usage level and poor ‘end of life’ management of plastic products has led to plastics becoming a major source of global marine pollution”* (World Economic Forum, 2016).

Marine plastic pollution has now become a new serious threat to marine ecosystems. Several studies indicate that plastic pollutants have threatened marine life. For instance, *“absorption of persistent organic pollutants onto plastic and their transfer into the tissues and organs through ingestion is impacting marine megafauna”* (Tanaka et al., 2013) as well as lower trophic-level organisms (Bakir, Rowland, & Thompson, 2014), and their predators (Farrell & Nelson, 2013). According to Carson et al. (2013), these impacts are further exacerbated by the persistence of floating plastics as resin pellets are transported into the microbial communities. These microbial communities serve as sources of food to those in the next level of the food chain.

In the ASEAN region, together with land pollution, marine plastic pollution is a major pressing environmental issue. According to a research by German scientists (Garcia et al., 2019), eight rivers in the region are among the top ten sources of plastic pollution in the world’s oceans (Schmidt, Krauth, & Wagner, 2017). Four rivers in Indonesia rank among the twenty most polluted in the world in terms of the metric tonnes of mismanaged plastic waste (Nature Communications, 2017). This makes Indonesia together with the Philippines, Vietnam, and Thailand as the top plastic-polluting states in the ASEAN region.

To add to the daily plastic consumption that this region is facing, the auxiliary weight that the COVID-19 situation has placed on the healthcare industry is insurmountable. In a very recent study completed by the Elsevier Public Health Emergency Collection earlier this year, personal protective equipment, also known

as PPEs, such as surgical masks, gloves and hazmat suits, face shields and respirators have significantly added to the amount of plastic wastage that it has *indeed* empowered plastic consumption to skyrocket within the last year. This study showed that in order to protect the entire world during one month of the pandemic, 129 billion face masks and 65 billion gloves would be necessary (Silva, et. al., 2021), and this does not include the disposable suits and other equipment that millions of healthcare workers use shift in and shift out to prevent contamination.

These equipment are all for single-use only. *And then, where do they go?* In Western countries, all PPEs are incinerated and greenhouse gases that are produced by these incinerators are purified by gas cleaning technologies. But what about in Southeast Asia? Locally, PPEs from hospitals and medical centers are also incinerated, however, there is no information on whether these incinerators employ any gas-cleaning technology to maintain the intactness of the environment (Sangkham, 2020). Furthermore, there is also the issue of haphazardly discarded face masks and face shields on streets, roads and even waterways.

In the past decade, governments and non-government organizations have addressed this issue and created some viable solutions associated with plastic use. Sustainable solutions currently underway are the use of biodegradable plastics, enforcing company social responsibility, waste segregation and plastic waste recovery systems (MoEF, 2021) (DENR, 2023).

Statement of the Problem

Indonesia and the Philippines are consistently ranked among the world's largest sources of marine plastic pollution. Inefficient collection systems, open dumping, and poor recycling rates mean that vast quantities of plastic waste are

mismanaged. In many coastal and rural areas, plastic waste is either burned, buried, or ends up in rivers, which act as direct conduits to the sea. This not only threatens marine ecosystems and wildlife but also poses risks to public health and the livelihoods of communities that depend on clean coastal waters for fishing and tourism (UNDP, 2024).

Despite growing awareness, efforts to tackle plastic pollution in Indonesia (UNDP, 2024) and the Philippines (UNEP, 2022) face significant challenges. These include limited funding for waste management, weak policy enforcement, and a lack of public education on sustainable consumption. However, both countries have taken steps toward addressing the issue, such as national action plans and partnerships with international organizations (Urbano, 2024).

This paper examined the root causes and impacts of plastic pollution in Indonesia and the Philippines, evaluated existing mitigation strategies, and proposed comprehensive, context-specific solutions that can lead to lasting change. This study culminates in a practical framework that is fit, workable, and contextually responsive to the diverse policy environments across ASEAN member states. It offers adaptable strategies that support regional collaboration, local implementation, and long-term sustainability in plastic waste management.

This study attempted to explore the interplay between national policies, local implementation, and community-driven innovations in addressing plastic waste management challenges in Indonesia and the Philippines and provide a comprehensive analysis and insightful responses to the following research questions:

- 1) How do Indonesia and the Philippines differ and align in their governmental policies on plastic waste management?

- 2) How are community awareness and engagement programs structured and implemented in both countries?
- 3) What innovative technologies are currently used to reduce plastic pollution in Indonesia and the Philippines?
- 4) Which private sector partnerships support anti-plastic initiatives in each country, and how effective are they?
- 5) How have policies shaped public behavior and cultural attitudes toward plastic use in both nations?

Purpose of the Study

In general, this study aims to compare the advancement of the two archipelagic Southeast Asian countries, namely, Indonesia and the Philippines, in handling and managing their own local plastic wastes, including those plastic wastes in forms of PPE during the Covid-19 pandemic period. This research gathered data on how their respective laws and roadmaps are performing in the face of the regional and global plastic waste crisis, and significantly, how situations have differed before and after the implementation of these roadmaps. Specifically, this study aims to: (a) determine the root causes and impacts of plastic pollution in Indonesia and the Philippines; (b) evaluate existing mitigation strategies; and (c) propose comprehensive, context-specific solutions that can lead to lasting change.

Scope and Limitations

The current research was focused on Indonesia and the Philippines that were selected based on their geography, population density, economic development, and recurring presence on global plastic pollution rankings. No attempt has been made to investigate the plastic waste management of other ASEAN countries. In addition,

the study focused only on plastic wastes while other wastes generated by these two countries were excluded in the analysis.

The study utilized both quantitative and qualitative methods where quantitative data included figures on plastic waste generation, recycling rates, and behavioral metrics while the qualitative data were extracted from policy documents, case studies, NGO and government reports and media articles. Key themes in both countries, including sources, distribution, impacts, mitigation efforts, policies, and environmental implications were identified. In addition, a comparative analysis of cultural habits, trends, and waste management practices, innovative solutions and technologies used in production, collection, dissemination, and government collaboration, and stakeholder engagement, covering government agencies, NGOs, communities, international organizations, and independent advocates were determined and analyzed from the various documents collected for the study. There were no attempts done to conduct a primary data collection either for quantitative or qualitative analysis. The analysis could also be potentially affected by societal differences and external influences, policy and institutional limitations such as inconsistent implementation, lack of resources, and differing political will, and differences in available data for each country. Sampling bias could also arise from uneven representation across areas or communities. However, key data were organized into comparative tables that mapped initiative characteristics (e.g., approach, scale, incentives, and stakeholders) to support a cross-country comparison and help identify recurring elements across the cases.

Chapter II

LITERATURE REVIEW

The Rise and Role of Plastic

Plastic was first created in 1870 by John Wesley Hyatt as a substitute for ivory, in response to a \$10,000 prize that aimed to curb the slaughter of endangered elephants whose tusks were in high demand for the production of billiard balls. At the time, ivory was both scarce and expensive, prompting the search for a synthetic alternative. Hyatt's breakthrough invention, called celluloid, was achieved through a chemical modification of cellulose by combining cellulose nitrate and camphor under heat. This material not only closely resembled ivory in appearance but also possessed the advantage of being flexible and moldable when heated. Its versatility and ease of mass production made it an attractive and sustainable alternative, leading to its widespread popularity in manufacturing. Celluloid laid the groundwork for further advancements, eventually leading to the development of modern synthetic plastics that have since transformed global industries.

Up until the early 20th century, chemists were on a race trying to create another invention that could compete with celluloid, yet there was little success. By 1907, Leo Baekeland introduced Bakelite™, a synthetic polymer, created through the amalgamation of various synthetic materials, such as phenol and formaldehyde that was cheaper and more versatile. However, it was mainly produced as electrical insulators, but it was a popular insulating material that soon, its uses began to dominate other products such as jewelry, electrical appliances and automobiles. Thus, Bakelite™ became the pacesetter for the Age of Plastics (American Chemical Society, 2019).

Ubiquity and Uses

Plastics present a huge number of utilities and has become integral to modern life due to their durability, lightness, and low cost. It is shatter proof leaving no chance of sustaining injuries from broken pieces and shards. And most importantly, it protects us and keep us above hygienic standards. Key uses include:

- 1) Packaging: The largest plastic consumer, driving the single-use plastic crisis.
- 2) Household Items: Plates, utensils, water bottles, and storage bags.
- 3) Medical Field: Essential for sterile tools like syringes, IV lines, and gloves.
- 4) Transportation: Lighter plastic parts improve fuel efficiency in cars and planes.
- 5) Electronics: TVs, microwaves, and fridges rely heavily on plastic parts due to its insulation and corrosion resistance (Connecticut Plastics, 2019).

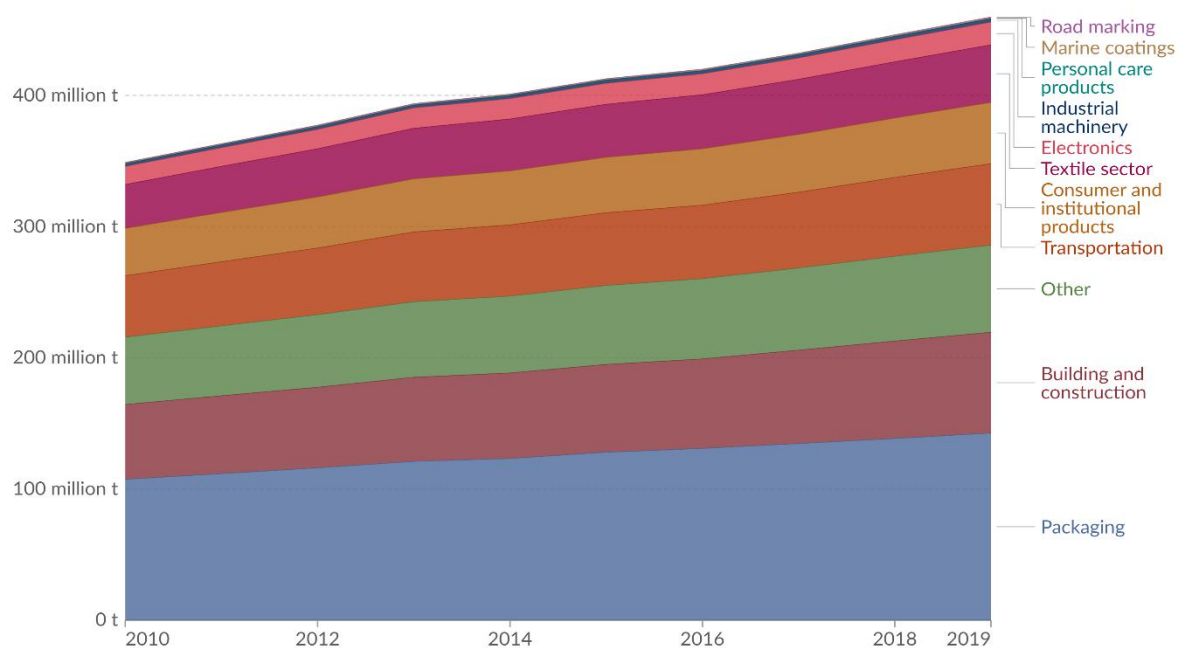
Plastic's Double-Edged Sword

While plastics have undeniably contributed to advancements in health, safety, and convenience—such as in sterile medical tools, food preservation, and protective packaging—their excessive and unchecked use, especially in disposable consumer goods and packaging, has led to severe and long-lasting environmental consequences. What was once seen as a symbol of modern efficiency has now become a global pollutant, clogging waterways, damaging marine ecosystems, entering food chains, and overwhelming waste management systems (American Chemical Society, 2019). The challenge lies not in the material itself, but in how societies produce, consume, and dispose of it—underscoring the urgent need for more sustainable production models, responsible consumption patterns, and effective policy interventions.

Figure 1 shows that packaging alone accounts for the largest share of global plastic production, far surpassing other sectors such as construction, automotive, textiles, and electronics. This dominance reflects the widespread use of lightweight, inexpensive, and disposable packaging materials, particularly in the food, beverage, and retail industries.

These materials are often designed for single-use convenience, prioritizing cost-efficiency and product shelf life over environmental sustainability. However, their short lifespan and high volume contribute disproportionately to plastic waste generation. Most end up in landfills, incinerators, or worse, the natural environment—especially oceans and rivers—where they persist for centuries, threatening ecosystems and public health. The prominence of packaging in plastic production underscores the urgent need to redesign systems toward reuse, recyclability, and reduction at the source.

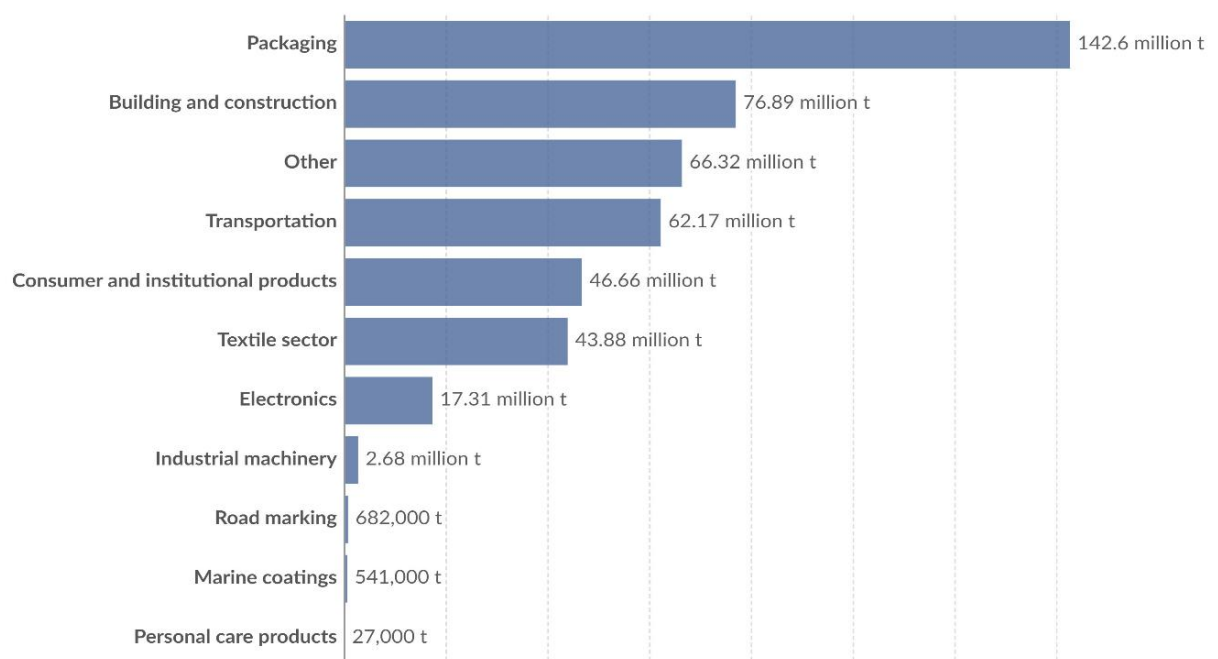
Figure 1. Global primary plastic production by industrial sector, 2010-2019



(Our World in Data, 2022)

Figure 2 below highlights how the packaging sector overwhelmingly dominates global plastic production and waste generation, making it the primary driver of single-use pollution across both developed and developing economies. This prevalence of short-lived packaging—ranging from multilayer sachets and flexible film wraps to disposable food containers and shipping materials—translates into a relentless and growing stream of low-value, non-durable plastics that often evade formal recycling systems and enter municipal waste streams within days of use. These items, due to their lightweight and composite nature, are notoriously difficult and economically unfeasible to recycle, resulting in their accumulation in landfills, waterways, and coastal environments. The figure thus underscores not only the scale of global dependency on disposable packaging, but also the urgency for systemic reforms—such as design innovation, reuse systems, and producer responsibility—to address the escalating crisis of plastic pollution.

Figure 2. Annual global plastic waste generation by industrial sector, 2019

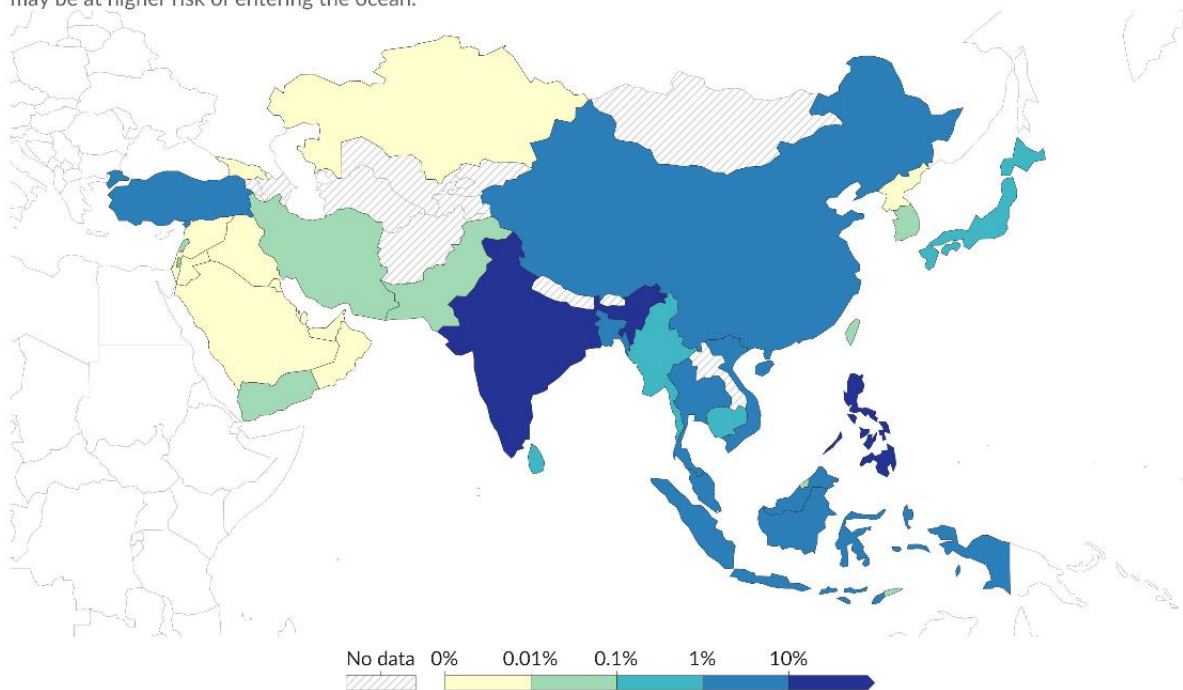


(Our World in Data, 2022)

Figure 3 illustrates the relative contribution of each nation to marine plastic leakage, vividly demonstrating how land-based mismanagement in Indonesia, the Philippines, and neighboring states cascades into ocean pollution hotspots.

Figure 3. Share of global waste emitted to the ocean, 2019

Annual estimate of plastic emissions. A country's total does not include waste that is exported overseas, which may be at higher risk of entering the ocean.



(Our World in Data, 2022)

Plastic Waste and Its Global Effect

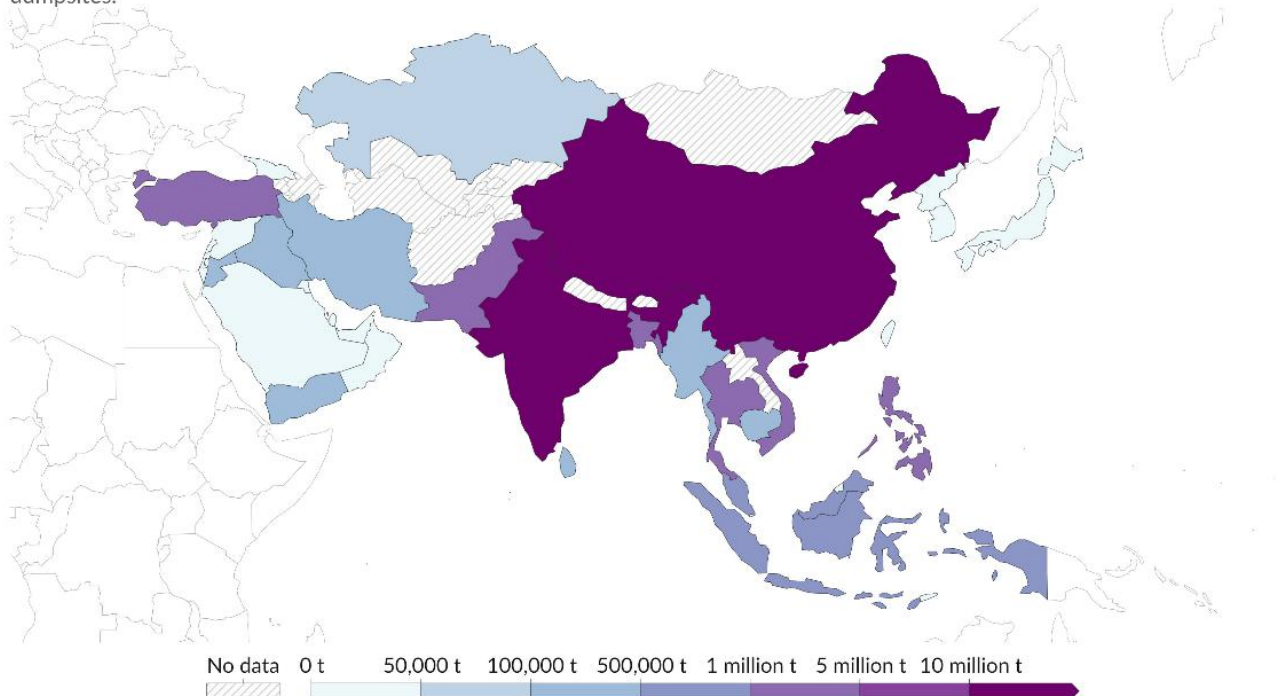
Since mass plastic production began in the 1950s, 8.3 billion metric tons have been produced, with 6.3 billion tons becoming waste—91% of which has never been recycled (Geyer et al., 2017). About 8 million tons enter the oceans annually, forming floating debris and littering coastlines (Parker, 2018). Roughly 40% flows through rivers and streams before reaching the sea, and plastics can take 50 to 1,000 years to decompose (LeBlanc, 2018).

Figure 4 depicts how Southeast Asia is among the worst offenders in plastic pollution. Indonesia, the Philippines, Malaysia, Thailand, and Vietnam rank among the world's top contributors of coastal and mismanaged plastic waste, driven by

urbanization, a growing middle class, and poor waste infrastructure (MoEF, 2020; Meijer et al., 2021; Ng et al., 2023; Bosquet, 2023).

Figure 4. Mismanaged Plastic Waste, 2019

Mismanaged plastic waste is waste that is not recycled, incinerated, or kept in sealed landfills. It includes materials burned in open pits, dumped into seas or open waters, or disposed of in unsanitary landfills and dumpsites.

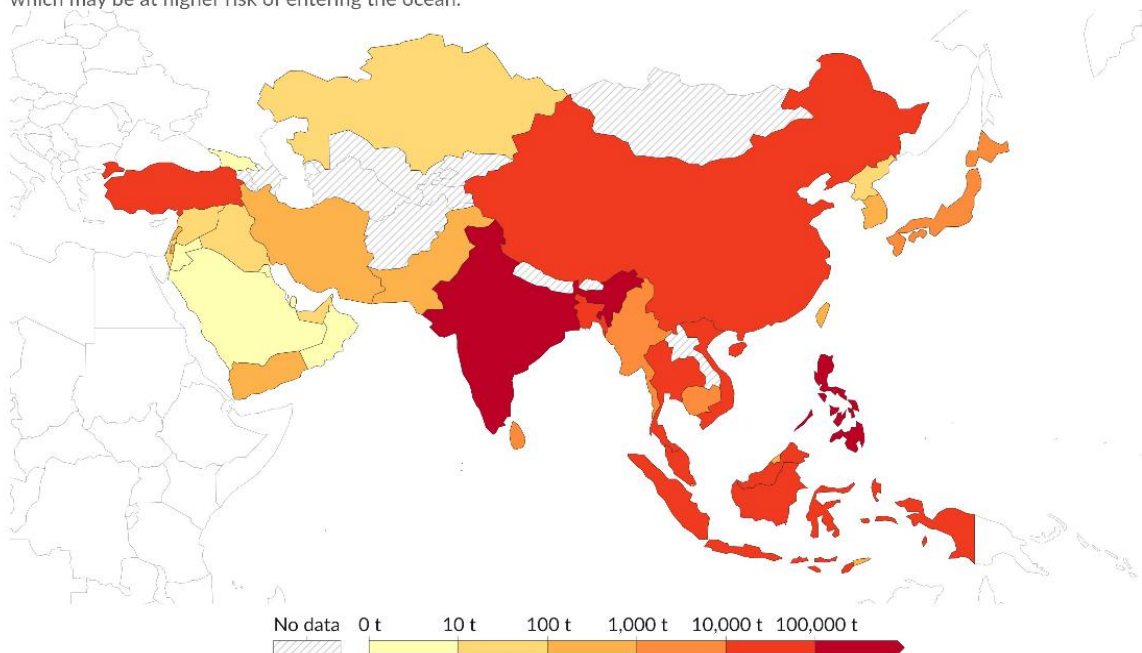


(Our World in Data, 2022)

Figure 5 reveals that the Philippines (Meijer, et al., 2021) is currently ranked as the top global contributor of plastic waste entering marine environments (Schachter, et. al., n.d.). Within the same global rankings, several other Southeast Asian nations also appear prominently: Malaysia ranks 3rd, Indonesia 5th, Vietnam 6th, (Nguyen, 2023) and Thailand 7th (Jirapornvaree, et. al., 2023). Additionally, countries such as Brunei, Cambodia, East Timor, and Myanmar—though smaller in scale—also contribute significantly to regional plastic leakage into oceans (Meijer, et al., 2021). These figures underscore the transboundary nature of marine plastic pollution across the ASEAN region, driven by a combination of inadequate waste management systems, high plastic consumption, and coastal geography.

Figure 5. Plastic waste emitted to the ocean

This is an annual estimate of plastic emissions. A country's total does not include waste that is exported overseas, which may be at higher risk of entering the ocean.



(Our World in Data, 2022)

As global population and consumerism rise, waste generation is projected to reach 3.4 billion metric tons annually by 2050 (World Bank, 2021), with actual levels potentially higher.

Plastic pollution, especially in oceans, has been documented since the 1970s. Early studies by Carpenter (1972), Colton (1974), and Baltz (1976) raised alarms, but were downplayed by the plastics industry (Cirino, 2019). Today, social media has amplified public awareness of its devastating effects. Marine animals, including whales in Indonesia, Italy, and the Philippines, have died from ingesting plastic waste (BBC News, 2018; Borunda, 2019).

Plastics break into microfragments consumed by zooplankton, entering the food chain and potentially reaching humans through seafood (Valentine, 2015; Leung, 2018). Beyond oceans, plastic waste continues to pile up in landfills, worsening environmental degradation (Ismail, 2018).

Forms of Intervention

Good hygiene practices help prevent the spread of infections and viral diseases, which is where single-use plastics are useful (Harvey, 2019). However, no effective alternatives to replace plastic entirely have been introduced locally. Governments have implemented measures like restrictions or levies on plastic use but have not banned it altogether (Falk, 2018).

As mentioned earlier, laws and agreements on waste disposal have been established, and many individuals continue to raise awareness about the dangers of plastic pollution. Despite these efforts, the problem persists (Greenpeace, 2019).

The ASEAN Organization has also taken steps to address plastic pollution by creating task groups that confront environmental issues. These include:

- 1) The **ASEAN Cooperation on Environment**, focusing on climate change and pollution, with a group dedicated to chemical and solid waste management (ASEAN, 2016).
- 2) The **ASEAN Declaration on Environmental Sustainability**, signed by all ASEAN members, encouraging technological advancements to combat pollution (ASEAN Secretariat, 2007).
- 3) The **ASEAN Agreements on Environment and Natural Resources**, signed by six ASEAN members in 1985, aiming to address environmental degradation and pollution control through better industrial practices (ASEAN, 1985).

International agreements also play a role, such as:

- 1) The **Paris Agreement** (2016), which focuses on ecosystem protection and sustainable production and consumption globally (UNFCCC, 2015).

- 2) The **Agenda for Sustainable Development Goals**, with goals that target sustainable consumption (Goal #12), marine conservation (Goal #14), and the use of terrestrial ecosystems (Goal #15) (United Nations, 2016).

National governments and NGOs have worked to enforce these agreements, especially limiting single-use plastics, like drinking straws. While many businesses comply, the impact has been limited because the focus is often only on specific items like straws, when food packaging and other plastics also need regulation (O'Donnell, 2018). The biggest challenge is that plastics are used in nearly everything, and many are single-use.

Improving plastic waste management requires significant investment in infrastructure, which remains scarce (Thomas, 2019). Additionally, modifying plastics during manufacturing has shown positive results in countries like Chile and Israel (Barr, 2019; Kitson, 2018; NAS Daily, 2019), as discussed further on page 65.

Waste Analysis and Characterization Survey (WACS)

The Waste Analysis and Characterization Study (WACS) is a crucial tool used by governments to understand the composition, volume, and sources of waste generated within a country (NPAP, 2020). In both Indonesia and the Philippines, WACS serves as a foundation for evidence-based policymaking and planning in solid waste management and is used to develop and improve policies such as plastic bans, EPR laws, and public awareness campaigns.

Key findings from WACS by Indonesia's National Plastic Action Partnership (NPAP) and the Philippines' National Solid Waste Management Commission (NSWMC) reveal that both countries are among the top contributors to plastic waste and marine pollution globally, driven by high population density, rapid urbanization, and inadequate waste infrastructure (NPAP, 2020; DENR-NSWMC, 2021; Jambeck

et al., 2015). Table 1 outlines both the striking parallels in their waste profiles and response strategies and provide critical insight into how national context influences the design and effectiveness of plastic waste management efforts.

Table 1

WACS Statistics for Indonesia and the Philippines

Aspect	Indonesia	Philippines
Annual Plastic Waste Generation	6.8 million tonnes annually	Not specified, but plastic waste is 15-20% of total waste
Mismanagement Rate	61% of plastic waste is mismanaged	Not specified, but significant mismanagement
Marine Plastic Leakage	346,500 tonnes of plastic waste discharged into oceans annually	Significant contributor to ocean plastic pollution
Recycling Rate	Only 10% of plastic waste is recycled	Not specified, but recycling remains a challenge
Plastic Consumption (Per Capita)	23 kg per capita in 2019	Not specified, but high plastic consumption in sectors like food and beverage packaging
Plastic Waste Share of Total Waste	20-30% of total waste	15-20% of total waste
Waste Management Infrastructure	Limited, outdated, and relies on informal collection	Limited, outdated, and relies on informal collection
Policy Initiatives	Plastic bans, Extended Producer Responsibility (EPR) laws, public awareness campaigns	Plastic bans, EPR laws, public awareness campaigns
Plastic Waste Leakage to Oceans	Contributes significantly, with various factors involved	Contributes significantly, with various factors involved
Challenges	Low recycling rates, significant plastic leakage, outdated infrastructure	Low recycling rates, plastic leakage, enforcement inconsistencies
Local Plastic Bans	Increasing, but inconsistent enforcement	Increasing, but inconsistent enforcement
Extended Producer Responsibility (EPR) Laws	Implemented for companies to manage plastic waste	Implemented for companies to manage plastic waste

Note. Adapted from Meijer et al., 2021; NPAP, 2020; DENR-NSWMC, 2021.

Urbanization

Studies show that rapid urbanization and economic growth in both Indonesia and the Philippines are closely linked to increased plastic production (Jambeck et al., 2015). As the middle and lower-middle classes grow, so does the demand for single-use plastics. Many food and household items are sold in small, affordable quantities, often in single-use plastic packaging. While this helps low-income households access basic goods, it leads to a large amount of non-recyclable plastic waste, much of which ends up as pollution.

Because plastics are durable and non-biodegradable, they can remain in the environment for centuries (Connecticut Plastics, 2019). In both countries, most plastic waste comes from households and everyday purchases. Single-use plastics are commonly littered in public areas. The rise of online shopping has also increased plastic waste through packaging materials like bubble wrap, ziplock bags, and adhesive tapes. In addition to households, sectors such as agriculture, construction, textiles, and industry also generate plastic waste (NPAP, 2020; DENR-NSWMC, 2021).

Transboundary Waste Pollution

The movement of waste, particularly plastic, across national borders via oceans, rivers, or trade—is a growing environmental concern for both Indonesia and the Philippines. As archipelagic nations with extensive coastlines, both countries are highly vulnerable to marine debris carried by ocean currents, trade routes, and monsoons. They face serious challenges with transboundary plastic waste, and as global plastic leakage hotspots, both have become focal points in the battle against transboundary plastic pollution in Southeast Asia. Several interrelated factors contribute to the growing concern over transboundary plastic waste:

A. Domestic Mismanagement

1) Lack of Waste Infrastructure

Many areas in both countries still lack proper waste facilities, especially in less developed regions. Without proper segregation and disposal systems, plastic waste ends up in rivers and oceans, often carried across borders due to ocean currents and their island geography (NPAP, 2022; Greenpeace, 2024).

2) Tourism and Coastal Development

As tourism expands, especially along coastlines, the use of single-use plastics increases. Coastal areas easily send this waste into the ocean, where it becomes part of transboundary pollution (MoEF, 2020; DENR-NSWMC, 2021).

3) Illegal Dumping and Weak Enforcement

Both countries struggle with enforcement. People and businesses can often dump waste illegally without immediate consequences. Action is usually only taken when citizens or officials push for it (NPAP, 2022; Greenpeace, 2024).

4) Consumer Behavior

Heavy use of single-use plastics and a lack of public discipline leads to littering, especially when trash bins are not available. This persistent behavior of improper disposal, combined with inadequate collection systems significantly increases the volume of mismanaged plastic waste that enters waterways, flows across borders, and ultimately contributing to regional marine debris (MoEF, 2020; DENR-NSWMC, 2021).

5) Industrial and Agricultural Waste

Industries, especially in manufacturing and agriculture, generate large amounts of hard plastic waste. Improper disposal from these sectors adds to the transboundary plastic problem (MoEF, 2020; DENR-NSWMC, 2021).

B. Plastic Waste Imports

In the past, both countries imported plastic waste from richer countries. Much of it was contaminated or non-recyclable, and due to weak infrastructure, it ended up in landfills or waterways. Both countries have since banned plastic waste imports, the environmental effects still remain (Asia Sentinel, 2024; Reuters, 2019; PNA, 2019).

C. Geography and Climate

Being archipelagic in nature and located in a region prone to typhoons, monsoons, and floods causes waste to wash out into the sea, contributing to international marine pollution (UNEP, 2022; Schachter & Karasik, 2022).

D. Global Shipping Routes

Indonesia and the Philippines are major shipping hubs. Waste discharge from ships—intentional or accidental—adds to marine pollution that reaches other countries (International Maritime Organization, n.d.).

To address this, both countries have increasingly recognized the need for stronger regional cooperation through platforms such as the Association of Southeast Asian Nations, which advocates for a shared marine debris action plan. Regional collaborations and support from international organizations have also built cross-border strategies, joint monitoring systems, and shared responsibilities in cleanup and prevention (Jambeck et al., 2015).

Table 2 presents summarized data on plastic usage and generation in Indonesia and the Philippines. Due to challenges in accurate measurement of production and waste, the figures are based on general estimates provided by reports from both governments. These limitations highlight the urgent need for a standardized data collection system to improve transparency and effectiveness.

Table 2*Data on Plastic Production*

Category	Indonesia	Philippines
Market Size	7.36 million tons	USD 1.93 billion
2024 Production	3.6 million tons	34.67 billion pesos worth
Annual Growth Rate	4.5%	6.4%
Import Dependency	- 50–60% of raw plastic materials are imported - Q1 2024 imports: USD 233.15 billion	- Over USD 2 billion/year in imports - 2023 imports: USD 2.68 billion (~2.1% of total imports)
Domestic Products	Polypropylene (PP) Polyethylene (PE) High-density polyethylene (HDPE) Polyethylene terephthalate (PET) Polybutylene Succinate (PBS) Stretch films Mulch films Polyethylene bags	High-quality resins High-density polyethylene Polyethylene terephthalate Polymer materials Polyethylene Polypropylene Polybutylene Succinate Injection-molded plastic products Customized plastic sheets
Foreign Products	Polyethylene Polyoxymethylene (POM) High-density polyethylene Acrylonitrile Butadiene Styrene Polytrimethylene Terephthalate (PTT) Polypropylene Polyester fiber Spandex filament Polycarbonate (PC) Polyurethane Biaxially oriented polyester (BoPET) Nylon (PA) Polylactic Acid (PLA)	Polypropylene Polyethylene Polytrimethylene Terephthalate Acrylonitrile Butadiene Styrene Polystyrene (PS) Polycarbonate Nylon Polylactic Acid Polyoxymethylene Thermoplastic elastomers Polyurethane High-density polyethylene Polyester fiber
Applications	Packaging, single-use plastics household items, agricultural and automotive industries and many other industrial applications.	Household items, single-use plastics, packaging and industries such as automotive, electrical, and agriculture.
Major Producers	- Chandra Asri Petrochemical - PT Lotte Chemical Titan - PT Polytama Propindo	- JG Summit Petrochemicals - Chemrez - NPC Alliance - Philippine Resins Inc.

Category	Indonesia	Philippines
Main users:	Food Packaging – 49.6%	Food Packaging – 40-60%
	Retail – 15-20%	Retail – 10-20%
	Construction – 16%	Construction – 5-10%
	Agriculture – 5-10%	Agriculture – 5-10%
	Tourism – 5-10%	Tourism – 5-10%
	Automotive – 6.8%	Healthcare – 5%
	Healthcare – 5%	Electronics – 5%
	Electronics – 5%	Transportation – 2-5%

Note. Adapted from SeaCircular, 2020; MoEF, 2020; German-Indonesian Chamber of Industry and Commerce, 2025; Urban Plastic, 2025; DENR-NSWMC, 2021; StanPlas, 2025; Sanko Plastics, 2025.

Plastic production in Indonesia and the Philippines has steadily increased over the past few decades, driven by rapid urbanization, population growth, and rising consumer demand. In Indonesia, plastic production reached around 6.8 million metric tons in 2021, with a significant portion used for packaging and single-use products. The Philippines, though producing less, still manufactures over 2 million metric tons annually, with similar consumption patterns focused on food, retail, and household packaging. Both countries rely heavily on imported raw plastic materials, and much of local plastic is unrecyclable, adding to growing waste and pollution challenges.

Table 3 shows data on plastic pollution in Indonesia and the Philippines that places both countries among the world’s top contributors to marine plastic waste. Both nations have made progress through legislation, public awareness campaigns, and international commitments, yet the scale of the problem continues to outpace current efforts. Addressing plastic pollution in these countries requires stronger government action, investments in waste management systems, and a shift toward sustainable production and consumption practices to reduce the environmental and health impacts of plastic waste (MoEF, 2020; DENR-NSWMC, 2021).

Table 3*Data on Plastic Pollution*

Indonesia	Philippines
2 nd largest producer of plastic waste globally	3 rd largest global contributor of plastic waste
4% annual growth in plastic pollution	6.3% in annual growth in plastic pollution
95% of plastics turn into waste; 3.2 million tonnes of unmanaged waste	80% of plastic waste is mismanaged
Food and beverage industry consumes 70% of total packaging supplies	Food and beverage industry consumes approximately 60% of all plastic consumption
Plastics comprise 15% of municipal solid waste	Plastics comprise 15-20% of municipal solid waste
Ocean leakage – 10% of global total (1.29 million tonnes annually)	20% leakage into the environment
Contributes to the world's most polluted rivers (Citarum, Brantas, Solo, Serayu and Progo)	Contributes to the world's most polluted rivers (Marilao, Pasig, Tullahan, Cagayan and Las Piñas)

Note. Adapted from SeaCircular, 2020; MoEF, 2020; German-Indonesian Chamber of Industry and Commerce, 2025; DENR-NSWMC, 2021

The dominance of single-use packaging as a key contributor to plastic pollution underscores the limitations in current data systems. These insights emphasize the need for accurate measurement, improved waste tracking, and upstream interventions to effectively address the root causes of plastic waste in both countries. Furthermore, this chapter has consistently highlighted gaps in enforcement, infrastructure, and behavioral change in the areas of study.

Theoretical Foundation

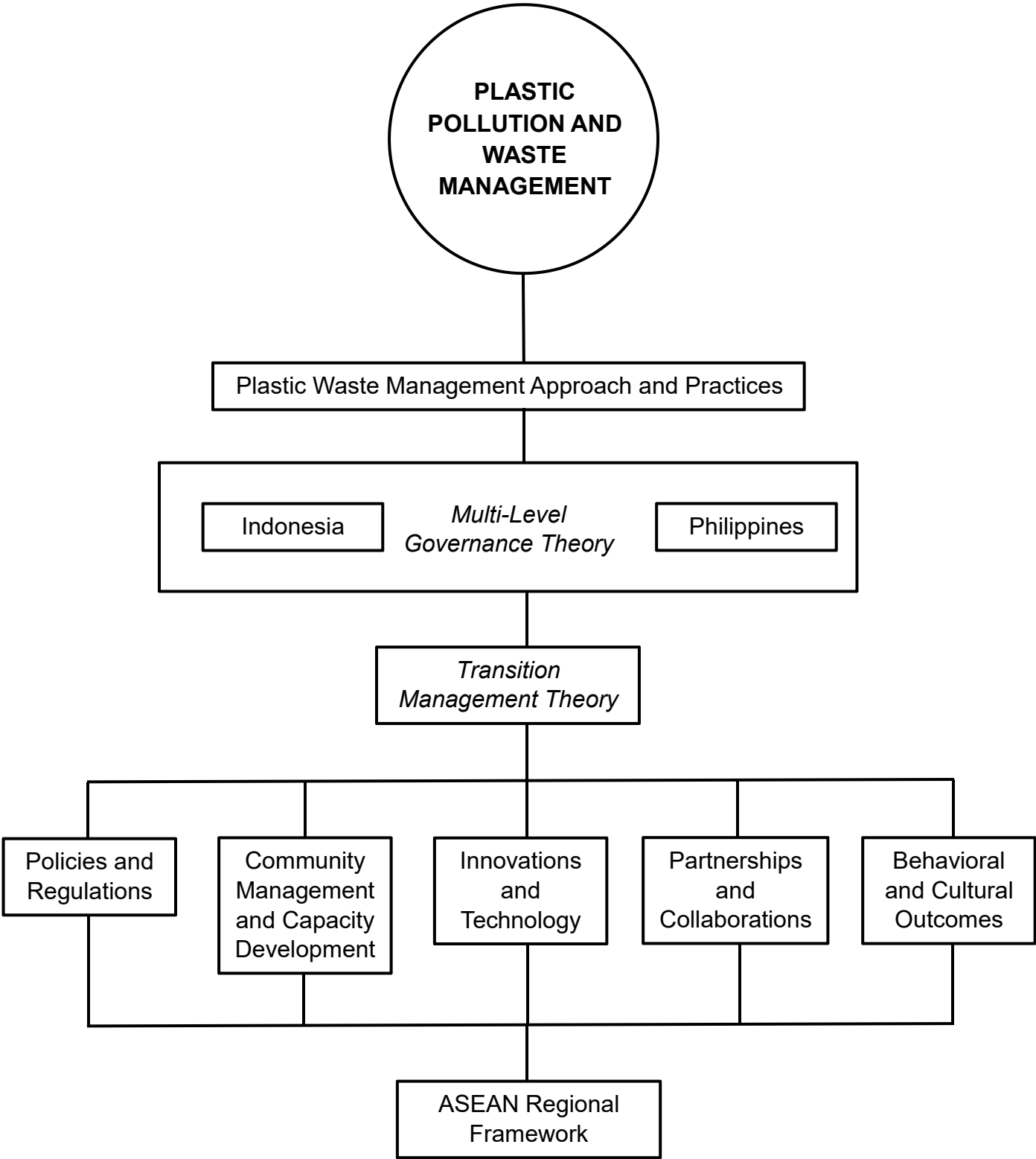
The conceptual framework of this study is grounded in two complementary theoretical perspectives. Primarily, it reflects the *Multi-Level Governance Theory*, which recognizes that sustainable governance depends on coordinated interaction

across national, regional, and local levels, as well as between state and non-state actors (Rawat, 2021; Development Asia, 2025). Indonesia's centralized planning contrasts with the Philippines' decentralized barangay-led interventions—yet both require effective linkages between levels of government, public-private actors, and community groups. MLG emphasizes the dispersion of authority across overlapping jurisdictions and recognizes the interplay between governmental and non-governmental actors (Hooghe and Marks, 2003). This aligns with the framework's structure, which integrates national policies, community-level practices, and transnational coordination.

Secondarily, this framework also reflects elements of *Transition Management Theory*, as developed by Loorbach (2010), which emphasize adaptive, participatory, and multi-actor collaborations. Through partnerships, public awareness, and community engagement, the framework adopts a “steering” rather than solely “command-and-control” approach, combining top-down mandates with bottom-up innovation, reflecting the dynamic and adaptive nature of plastic waste governance.. This approach is critical for navigating complex waste systems and achieving sustained, equitable change (Manaysay, 2025; PWC, 2023).

Together, these theories provide a robust foundation for understanding how structured policy and organic innovation can co-exist to address complex environmental challenges in a scalable and context-sensitive manner.

Figure 6. Conceptual Framework



Chapter III

METHODOLOGY

This chapter discusses the methodology utilized and implemented in the study in collecting, processing, analyzing and presenting the data and explains the rationale behind the chosen research design and how it aligns with the study's objectives and research questions.

Research Design

The study used both quantitative and qualitative methods for data collection and analysis. It has examined five key aspects of plastic waste management to assess the situation in Indonesia and the Philippines to be able to propose a framework for the recommendations of potential solutions that could address plastic waste management challenges in both countries.

1. Policies and Regulations

Banning single-use plastics is a common approach in both Indonesia and the Philippines, but it is not always the most effective. This research examined whether supplementary measures—such as Extended Producer Responsibility and public education—have led to improvements in waste management practices. It also assessed the feasibility of reducing plastic production in developing societies. By comparing conditions before and after the implementation of key regulations, including amendments to the Solid Waste Management Acts, the study evaluated whether these policies have successfully reduced plastic waste generation and promoted recycling and reuse (SeaCircular, 2020).

2. Community Management and Capacity Development

Public awareness plays a crucial role in changing long-standing habits around plastic use. In both Indonesia and the Philippines, this research assessed how education and awareness campaigns have influenced consumer behavior and whether these efforts were sustained or one-time initiatives (Stojic & Salhofer, 2022). It also emphasized that addressing plastic pollution requires collective action—not just from governments, but also from companies, communities, and individuals actively participating in solutions, including innovations in plastic waste recovery.

3. Innovations and Technology

Technology has played a key role in addressing waste management, especially since the early 2000s. This research highlights the innovations developed and adopted in Indonesia and the Philippines to combat plastic pollution, and identifies companies actively contributing to these technological solutions (Schilling, 2019) (DOST, 2025). These advancements not only streamline waste collection and processing but also empower communities and local governments to monitor, track, and reduce plastic waste more effectively.

4. Partnerships and Collaborations

Neither governments nor government action alone is enough to change a society single-handedly, and solve plastic pollution; strong political will and collaboration with civil society are essential. This research explored how Indonesia and the Philippines have partnered with NGOs and international organizations to combat plastic waste, adopt relevant technologies, and implement joint campaigns. It also assessed the outcomes of these efforts and identified future opportunities to enhance awareness and reduce plastic use (Geneva Environment Network, 2024).

5. Behavioral and Cultural Outcomes

This research examined shifts in consumer behavior and consumption patterns in Indonesia and the Philippines influenced by plastic bans and Extended Producer Responsibility (EPR) laws. It assessed how regulations and awareness campaigns have shaped societal attitudes and whether these changes led to lasting reductions in plastic waste or were merely short-term trends (Allison, et al., 2022).

Proposed Regional Framework

All these factors—along with each country's strengths, weaknesses, and challenges—were analyzed to form a set of recommendations and identify future opportunities to improve plastic waste management. The study ultimately proposes a regional framework that may serve as a guide for replication across Southeast Asia and as a benchmark for future research amid evolving technologies and shifting societal behaviors. This framework emphasizes the importance of cross-border collaboration, policy coherence, and culturally grounded solutions to ensure long-term impact and resilience in addressing the plastic crisis.

Selection of Countries

This study focused on Indonesia and the Philippines—two Maritime Southeast Asian countries—due to their high population densities, significant plastic pollution issues, and vulnerability to transboundary plastic waste. Both nations consistently appear in global rankings among the top 10 contributors of mismanaged plastic waste, ocean-bound plastic emissions, and riverine plastic discharge. They also rank low in waste management capacity, making them critical case studies for understanding and addressing plastic pollution (Richie et al., 2023)

Data Collection

To compare plastic waste management in Indonesia and the Philippines, this study used a combination of both qualitative and quantitative approaches. Quantitative data included figures on plastic waste generation, recycling rates, and behavioral metrics. Qualitative data came from policy documents, case studies, NGO and government reports and media articles. Data Collection were acquired through a combination of tools and sources:

- a) Document Analysis: National laws, policies, regulations and local and international reports.
- b) Secondary Sources: NGOs and platforms such as Statista, World Bank, and country-specific news reports.
- c) Case Studies: Local community and pilot initiatives.

Data Analysis

The thematic findings were developed through qualitative analysis of the data extracted from all available sources. The researcher began by reviewing national and local policy documents from Indonesia and the Philippines, including laws, regulations, and waste management plans, to understand the policy context surrounding plastic wastes and their management in both countries. This was followed by a structured review of secondary literature, such as NGO reports, international agency publications, and case studies highlighting non-regulatory and community-based practices.

Key data were organized into comparative tables that mapped initiative characteristics (e.g., approach, scale, incentives, and stakeholders). These tables

supported a cross-country comparison and helped identify recurring elements across the cases.

Using thematic analysis, the researcher manually coded the initiatives by identifying patterns in their objectives, methods, and outcomes. Themes were refined through constant comparison and triangulated against academic literature to ensure analytical rigor. The interpretation of findings was aligned with the five core areas of the research: policies and regulations, community capacity, innovations, partnerships, and behavioral outcomes.

To support the analysis and enhance clarity, visual aids were incorporated throughout the study. Tables and figures illustrated different trends and infographics were created to simplify key findings for public audiences, such as differences in consumer reuse habits and government policy focus.

Ethical Considerations

To ensure the integrity, dignity, and welfare of all participants and stakeholders, this study adhered to established ethical standards, including principles of informed consent, data confidentiality, voluntary participation, and responsible reporting:

1) Cultural Sensitivity and Contextual Awareness

Recognizing the sociocultural diversity of Indonesia and the Philippines, the research design and implementation were guided by a deep respect for local traditions, values, and community dynamics. Culturally appropriate language, behavior, and engagement strategies were employed to avoid ethnocentric bias and to foster mutual trust and cooperation with stakeholders.

2) Social Utility and Minimization of Risk

The study was designed to generate actionable knowledge with tangible benefits for environmental governance in Southeast Asia. Risks to participants, institutions, and ecosystems were proactively identified and mitigated. The primary objective was to inform sustainable policy development and support community-based plastic waste mitigation efforts.

3) Equity and Accessibility

The dissemination of findings adhered to principles of equity and inclusion. Data and insights were made available to all relevant stakeholders—including policymakers, NGOs, local communities, and academic institutions—ensuring that no party was disadvantaged or excluded from the knowledge production process.

4) Transparency and Informed Collaboration

Open and consistent communication was maintained with all collaborators and informants. Stakeholders were informed of the research objectives, methodologies, and intended outcomes, and consent was secured where appropriate. This ensured that participation was voluntary, informed, and based on mutual understanding.

5) Regulatory and Ethical Compliance

The study complied with established ethical standards for research involving human subjects and environmental data, in alignment with institutional review board (IRB) requirements and regional protocols in Southeast Asia. It also observed the ASEAN Framework on Environmentally Sustainable Research and relevant national guidelines governing research conduct in both countries.

Chapter IV

FINDINGS OF THE STUDY

This chapter presents the key findings derived from the qualitative analysis of policy documents, community practices, and stakeholder inputs in Indonesia and the Philippines. It examines the various interconnected factors—regulatory, institutional, social, cultural, and economic—that contribute to the observed patterns of plastic waste management in both countries. The chapter also highlights emerging themes, cross-country similarities and differences, and the implications of these findings for future policy direction, community engagement, and regional cooperation. By linking evidence to the research questions and broader theoretical framework, this section aims to provide a clear, nuanced, and actionable interpretation of the results, contributing to both academic understanding and practical solutions for Southeast Asia's ongoing plastic pollution crisis.

Country Context

A. Indonesia

With a population exceeding 284 million, Indonesia is the world's fourth most populous country and has undergone rapid urbanization over the past five decades. From being 51% urban in the 1970s, it is projected to become 70% urban by 2045 (Roberts et al., 2019). This transformation, alongside a nine-fold GDP increase since the 1950s, has contributed greatly to rising plastic waste. In 2023, the Indonesian Institute of Sciences found that Indonesia accounts for 7.5% of global ocean plastic waste—around 600,000 tonnes—driven largely by urban growth and a thriving tourism industry. In 2022, Indonesia ranked 32nd globally in the Global Tourism Index (Lotulung, 2023; World Economic Forum, 2022).

B. Philippines

Composed of over 7,100 islands, the Philippine Islands has the second largest population in Southeast Asia and the 14th most populous country in the world with over 116 million citizens (Table 4.1). As is typical with developing countries, rapid urbanization has moved ordinary citizens into cities nationwide which pushed its economic and social limits leading to internal pressures and government systems that fell far behind from growth and development that was meant to be directly proportional with urbanization (Sur, et al, 2023). Furthermore, as indicated in Table 4.1, the Philippines surpassed Indonesia in polluting the oceans with plastic (Ramos, 2023; Wicaksono, 2023), and it is still struggling to cope with issues, such as regulation and enforcement, that should have been already in place and producing desired results (USAID, 2022).

Table 4

Data on countries of study

Country	Indonesia	Philippines
Population (Worldometer, 2025)	284,863,290; 285,212,816	116,424,560; 116,572,194
Urbanization (Worldometer, 2024)	59.7%	47.4%
Global Tourism Index (2019-2020) (World Population Review, 2024)	44 th	81 st
Plastic Consumption	Produces 768,000 tons of plastic sachets annually (DTE, 2022); 17kg/per capita/ per year; produced 9.8 billion plastic bags and 95% became waste (Sea Circular, 2020)	Produces 2.7 million tons of plastic waste annually as of 2021; typically unrecyclable sachets available to lower-income families (World Bank, 2021)
Contribution to Ocean Pollution	5 th ; 56,333 metric tonnes Archipelagic countries are more prone to ocean pollution	1 st ; 356,371 metric tonnes

Country	Indonesia	Philippines
(Wicaksono, 2023)	due to the length of coastlines compared with the actual land area (Meijer, et al, 2021)	
	Reliance on single-use plastics helps prevent the spread of bacteria and viruses	
	Lockdowns' contribution to plastic waste generation	
Effects of Covid-19 on Plastic Pollution (EU-ASEAN Business Council, 2021)	Led to changes in plastic production and consumption patterns	
	Stalled any progress the ASEAN has made in dealing with plastic pollution	
	Led to an increase in online shopping, spiking packaging material usage	
	Made recycling unreliable due to viruses' lingering longer on plastic surfaces	
	Reduce and reuse habits are very common and easier to accomplish	
Waste Management Practices (SeaCircular, 2020)	Insufficient emphasis on recycling and recycling facilities	
	Waste segregation culture has little to no existence	
	Lack of government investment on recycling infrastructure	
	91% concern for plastic pollution	
	54% who are actually, reusing and recycling	
Factors influencing actual habits (SeaCircular, 2020)	47% require mandate from government implementing 3Rs	
	76% believe there is a lack of information campaigns for waste management	
	A huge gap between concern for plastic pollution issues and buying habits	

Note. Contextual information on Indonesia and Philippines relating to population and its corresponding plastic consumption, generation and pollution.

Key Drivers of Plastic Pollution in Indonesia and the Philippines

Indonesia and the Philippines share many cultural and consumer habits that have significantly contributed to the escalating problem of plastic pollution, particularly in the context of rapid urbanization, expanding middle-class populations, and the rise of convenience-driven lifestyles. As both nations continue to experience economic growth and increasing demand for packaged goods, the use of disposable plastics has surged across urban and rural communities alike. Four key interrelated factors underpin and intensify this growing issue:

1) *The Sachet Economy*

To meet the needs of low- and middle-income families, smaller quantities of daily essentials are widely produced and sold in sachets. While affordable and convenient, these single-use plastic sachets are non-recyclable, and due to inadequate waste collection systems, they often end up accumulating in landfills, clogging drainage systems, or polluting waterways and coastal areas.(World Bank, 2021; DTE, 2022).

2) Online Shopping Boom

E-commerce has surged, bringing with it massive amounts of plastic packaging. In 2024, Indonesia's online market hit \$44.7B, while the Philippines reached \$16.1B (Globe Newswire, 2024). Protective packaging is overused to avoid product damage, leading to 7.8 million tons of plastic waste in Indonesia and 1.7 million tons in the Philippines annually (Yunisa et al., 2024; Phys.org, 2024).

3) Convenience vs. Environmental Concern

Despite rising environmental awareness, daily habits reveal a cognitive disconnect for many. People on the lower-income strata still opt for sachets due to affordability, and many buy plastic-wrapped items in convenience stores, and accept excess packaging in food deliveries out of convenience (Edoria et al., 2023; del Prado et al., 2024; Science Daily, 2023).

4) Government Role is Crucial

Evidence suggests that behavioral shifts among consumers are more pronounced when governments implement decisive and well-enforced regulatory measures. Past plastic bans that were enforced properly and visibly, sparked widespread habit changes, with reusable bags, bottles, and containers gaining popularity (SeaCircular, 2020; Greenpeace, 2023).

Waste Management Practices

A regional survey conducted in 2020 across Southeast Asia revealed important trends in household-level plastic waste management, particularly in Indonesia and the Philippines. The results for Indonesia and the Philippines, represented in Table 5, suggest that while many households actively engage in reducing and reusing plastic materials, the practice of recycling remains significantly underdeveloped and underutilized. This discrepancy highlights a major gap in the waste management chain: although the public is becoming more conscious of minimizing plastic use, structural and educational barriers continue to limit the full adoption of recycling practices (SeaCircular, 2020).

Table 5

3R Practices in Indonesia and the Philippines

Rank	Indonesia	Philippines
1	Reduce my use of disposable plastic products	Reduce my use of disposable plastic products
2	Use reusable water bottles, grocery bags, and plastic alternatives	Use reusable water bottles, grocery bags, and plastic alternatives
3	Buy and use only what I need	Dispose of my litter, including plastics, in the appropriate bins
4	Dispose of my litter, including plastics, in the appropriate bins	Buy and use only what I need
5	Reuse disposable products	Reuse disposable products

Note. Adapted from SeaCircular, 2020.

This table compares the top consumer 3R (Reduce, Reuse, Recycle) behaviors that are culturally adapted in Indonesia and the Philippines, highlighting both countries' shared strengths in waste-conscious practices and the persistent behavioral and systemic challenges that hinder wider adoption and long-term effectiveness.

1) Common Habits: Reduce and Reuse

Both countries prioritize reducing and reusing plastic. In Indonesia, 56% of Gen Z use reusable bottles, and 31% use recycled materials (Statista, 2024). In the Philippines, 75% use reusable bags (Statista, 2024). While positive, these habits still lead to eventual waste as reused plastics wear out. Long-term impact requires sustained cultural reinforcement (Green Dot Bioplastics, 2020; Enfuse, 2024).

2) Weak Waste Segregation Culture

Proper waste segregation remains poor. In Indonesia, only 25.8% of Java's population segregate waste; the rest of the country fares worse at 16.6% (Statista, 2023). In the Philippines, 44% always segregate, while 20% never do (PNA, 2023). Labeling bins is often ineffective, with scavengers filling the gap in waste sorting (Marks, 2019).

3) Low Recycling Rates and Awareness

Recycling is the least practiced 3R action. Indonesia recycles just 13% of its 36 million tons of plastic waste, and the Philippines 28% (BerAKHLAK, 2024; PNA, 2023). Many view recycling as inconvenient or are unaware of available programs (Martin & Douglas, 2022).

4) Insufficient Recycling Infrastructure

Indonesia has 1,300 recycling centers but processes only 10% of its plastic waste, with 57% mismanaged (The Jakarta Post, 2025). The Philippines has 780 centers and mismanages 20% of its waste (World Bank, 2021). Many plastics remain unrecyclable, placing responsibility on producers under Extended Producer Responsibility laws (DENR, 2023). Both countries still lack adequate infrastructure to meet growing waste demands (Marks, 2019; SeaCircular, 2020).

Table 6 presents 3R practices in both countries. Primary obstacles of this practice is the scarcity and uneven distribution of recycling facilities, especially in suburban and rural areas, where a part of the population resides. Even in urban centers, existing facilities are overwhelmed, poorly maintained, or inaccessible.. Compounding the issue is the lack of public awareness and education regarding proper recycling protocols. Many households are unsure about how to segregate waste properly, what materials are recyclable, or where to bring them once segregated (Martin & Douglas, 2022). These factors collectively diminish the impact of individual and community efforts, despite the willingness to participate.

Table 6
3R Practices in Indonesia and the Philippines

3R Component	Indonesia	Philippines
Reduce	Legislation: Enacted <i>Law No. 18/2008 on Solid Waste Management</i> , which mandates waste reduction at the source through integrated management systems, emphasizing the extended responsibility of producers and households.	Legislation: Enforced <i>Republic Act No. 9003 or the Ecological Solid Waste Management Act of 2000</i> , mandating LGUs to implement source reduction and adopt environmentally sound waste management practices.
	Programs: Piloted zero-waste city models and offered fiscal incentives for industries adopting cleaner production technologies. Awareness campaigns promote behavioral change targeting excessive consumption and overpackaging.	Programs: Enforced the 25% minimum waste diversion target for solid waste generators and promoted Extended Producer Responsibility (EPR) under <i>RA 11898</i> , requiring companies to reduce plastic waste volume through redesign, reuse, or alternative packaging.
Reuse	Initiatives: National campaigns encourage reusable household items, cloth shopping bags, refillable containers, and the integration of reuse models in the retail sector.	Initiatives: Implemented reuse-focused education in schools and community centers, supported by national campaigns like “Walang Plastikan” and “Reuse Revolution.”

3R Component	Indonesia	Philippines
	Community Engagement: Local governments support reuse through school-based programs, waste banks, and market-based incentives such as swap-and-save schemes. Efforts are guided by circular economy principles under the <i>National Action Plan on Marine Debris</i>. Infrastructure: Developed regional composting facilities, recycling parks, and <i>Industrial Symbiosis</i> zones to enable material flow between industries. Waste banks and local cooperatives are integrated into the formal recycling economy.	Community Engagement: LGUs actively promote reusable alternatives in barangays, including barangay reuse stations and local upcycling initiatives that turn textile, paper, and glass waste into saleable goods. Infrastructure: Established over 13,000 operational <i>Material Recovery Facilities (MRFs)</i> as mandated by RA 9003, alongside local composting and plastic recycling centers. MRFs serve as community-level recycling hubs.
Recycle	Programs: Implemented <i>e-waste recovery frameworks</i> in collaboration with IT manufacturers. Strengthened informal sector involvement through cooperatives and skill development, and introduced producer-supported buyback schemes for post-consumer materials.	Programs: Promoted LGU-private sector partnerships, such as the <i>Aling Tindera</i> plastic exchange program and recycling incentive systems in schools and public markets. Participation of waste pickers has been supported through formalization and capacity-building under DENR guidelines.

Note. Adapted from SeaCircular, 2020; The World Bank, 2022.

Another compounding effect of 3R is the critical, yet often overlooked, informal waste sector, which remains central to the actual collection, sorting, and recovery of recyclable materials. Due to their exclusion from formal waste management systems, these workers often work independently, operate without adequate protective tools or safety equipment and live under substandard daily income.. The absence of structural integration not only subjects them to heightened health and environmental risks but also results in fragmented and suboptimal recycling outcomes (SeaCircular, 2020).

Indonesia

Table 7

Policies on Indonesia's Solid Waste Management System

Republic of Indonesia 	
Laws & Regulations	Solid Waste Management Act (No. 18/2008)
	MoEF Decree No.13/2012 on Guidelines for Implementation of Reduce, Reuse and Recycle through Waste Bank
	Government Regulation on Excise on Plastic (Plastic Bag Tax 2016 and 2018)
	Regional/Local Regulations on Single-use Plastics Ban: - Pergub Bali No. 97/2018
	Governor Regulation No. 142 of 2019 (Obligation to Use Environmentally Friendly Shopping Bags)
Roadmaps & Policies	Governor Regulation No. 142 of 2019 Concerning the Obligation to Use Environmentally-Friendly Shopping Bags at Shopping Centers, Swalayan Stores, and Traditional Markets
	Presidential Regulation No. 83/2018 on Marine Debris Management
	MoEF Decree No. P.75/2019 on Roadmap to Waste Reduction by Producer
	MoEF Circular Letter No. SE.2/MENLHK/PSLB3/PLB.3/3/2020 on infectious(hazardous) and domestic waste management from COVID-19 response

Note. Adapted from: MoEF, 2021; House of Representatives, 2021..

Laws and Regulations

Indonesia has implemented several policies to tackle plastic waste, though results have been mixed. The Solid Waste Management Act (2008) aimed to eliminate open dumping by 2013 but failed due to low collection rates (MoEF, 2020). The Waste Bank Regulation (2012) incentivized recycling through localized collection stations, yet it saw limited success due to poor infrastructure and low public awareness (UNEP, 2022; Wang & Karasik, 2022). Efforts to introduce a

plastic bag tax in 2016 and 2018 were quickly revoked over concerns from small businesses (Gokkon, 2018).

More targeted local regulations have shown greater impact. DKI Jakarta's 2020 plastic bag ban, under Governor Regulation No. 142, reduced usage despite the pandemic (Dietplastik Indonesia, 2021). Similarly, Bali's 2019 single-use plastic ban—the first of its kind—proved successful and inspired broader adoption (ACESP, 2023). However, in West Jakarta, a comparable policy struggled with implementation due to the higher costs of eco-friendly alternatives and limited accessibility for lower-income residents (Joneri & Rahayu, 2021).

Roadmaps and Policies

Indonesia's National Plan of Action for Combating Marine Debris (2018–2025), established under Presidential Regulation No. 83/2018 (See Appendix C), sets an ambitious target of reducing marine plastic leakage by 70% by 2025. Backed by a substantial US\$1 billion national budget, the plan details nearly 60 targeted interventions, ranging from expanding waste collection systems and landfill control to investing in public education and scientific research on plastic alternatives. Within just two years of implementation, the country reported a 15.3% reduction in marine debris, demonstrating early momentum and institutional commitment to addressing marine plastic pollution at scale (MoEF, 2020). The plan emphasizes a multi-stakeholder approach, involving local governments, industries, NGOs, and academic institutions in a coordinated effort to achieve long-term sustainability goals.

In parallel, the Extended Producer Responsibility (EPR) Roadmap, issued under MoEF Decree No. P.75/2019, mandates that producers redesign product packaging to be more environmentally friendly, reduce reliance on single-use plastics, and implement take-back or reverse logistics systems. Although the

roadmap is still in its early implementation phase, it provides a structured and legally supported framework for holding manufacturers accountable for the entire lifecycle of their products. It also aligns with global circular economy principles, encouraging long-term shifts in industrial production and consumption habits (DEPA, 2021).

During the COVID-19 pandemic, Indonesia saw medical waste rise by over 30% as PPE and single-use supplies surged. To address this, the Ministry of Environment and Forestry issued Circular Letter No. SE.2/2020, allowing on-site incineration and third-party waste handlers. Although essential for the health emergency, these measures strained existing waste infrastructure. Their long-term environmental impacts—on emissions, soil and water quality, and ongoing plastic reduction initiatives—remain under review (World Bank, 2021; Greeneration Foundation, 2021).

Public Consciousness

Public awareness has been central to Indonesia's fight against plastic pollution. The NGO Gerakan Indonesia Diet Kantong Plastik (GIDKP), launched in 2013, led impactful campaigns like plastic-for-reusable-bag exchanges and river pollution tours. Their efforts influenced early trial bans and played a key role in Jakarta's Governor Regulation No. 142/2019, which supports the national goal to cut waste by 30% by 2025. GIDKP's collaboration with the Ministry of Environment and Forestry helped scale bans across cities.

This and many other public-driven initiatives have not only shifted consumer behavior but also increased accountability among retailers and local governments. As awareness continues to grow, sustained civic involvement is expected to reinforce the implementation of plastic reduction policies and inspire similar models across the ASEAN region.

Successes

Indonesia has made significant strides in plastic waste management since launching its National Plan of Action on Marine Debris in 2018, achieving a reported 15.3% reduction in coastal plastic waste (Greeneration Foundation, 2021). This progress is partly attributed to the establishment of waste processing facilities on small islands, a major logistical and environmental challenge that Indonesia has begun to address with localized infrastructure. The Ministry of Finance has also introduced incentive schemes for cities that successfully reduce plastic waste generation, encouraging local governments to adopt and innovate waste solutions. As a result, around 20% of cities have implemented local plastic bans, with urban centers like Jakarta and Bali at the forefront of enforcement and public participation. The country's waste management strategy places emphasis on the 3Rs—Reduce, Reuse, Recycle, and is tailored to suit regional and cultural contexts, allowing for flexible implementation based on local needs and capacities (World Bank, 2021).

Failures

Despite progress, Indonesia continues to face major systemic challenges. While the Solid Waste Management Act of 2008 exists to provide a legislative framework, it suffers from weak enforcement and inconsistent implementation across regions. A 2016 attempt to introduce a plastic bag levy was later revoked due to legal and political complications, revealing gaps in regulatory resilience. Recycling efforts remain heavily dependent on the informal sector, which currently handles only about 5% of the country's total waste, limiting its impact. Public awareness of waste segregation remains low, particularly outside urban centers, while informal recyclers lack adequate training, tools, and safety gear. Poor infrastructure leads to

unsegregated waste being dumped in landfills, reducing recycling efficiency and harming the environment.

Lack of coordination between local and national government agencies hinders the consistent application of waste management policies. Moreover, limited financial resources and technical capacity at the municipal level further constrain the implementation of sustainable waste management solutions. Without targeted investments and long-term policy alignment, Indonesia's plastic crisis may continue to escalate despite the presence of national commitments. Addressing these institutional and logistical weaknesses is essential for Indonesia to transition from fragmented efforts to a cohesive, nationwide strategy for plastic pollution reduction (World Bank, 2021).

Emerging Companies

Indonesia is emerging as a regional leader in innovative approaches to plastic waste management, particularly through the rise of green startups and alternative systems that prioritize sustainability and circularity. In response to the mounting challenges of plastic pollution, a growing number of Indonesian enterprises are taking bold steps to disrupt traditional waste disposal methods and replace them with scalable, locally adapted solutions. These innovations range from biodegradable packaging alternatives and digital waste collection platforms to refill stations and closed-loop systems that reduce single-use dependency. By addressing both environmental concerns and social inclusion, these companies are not only reducing plastic leakage but also creating green jobs and increasing public awareness. Table 4.4 highlights several notable examples of these forward-thinking enterprises and the alternative solutions they bring to the table, showcasing Indonesia's potential to lead sustainable transformation in Southeast Asia.

Table 8*Companies focused on Plastic Waste Mitigation*

Startup/ Initiative	Location	Type	Purpose	Method/Approach
Rebricks (2025)	Jakarta	Waste Management /Alternative	Convert multilayered plastics into eco-construction bricks	Collect rejected plastic → Compress into pavers for construction use
Bantubumi (Marsudi, 2021)	Bekasi	Waste Management	Recycle local plastic into raw material for industry	Tech platform connects collectors to recycling → sells raw plastic to manufacturers
Katingan Mentaya Plastic (KMP) (2018)	Sampit (Central Kalimantan)	Waste Management	Clean up rivers and recycle collected plastics	Collect from riverbanks → Sort → Produce secondary products
E-Loak (2015)	Jakarta	Waste Management /Marketplace	Encourage upcycling and support artisans	App-based waste collection → Craftspeople upcycle → Products sold on marketplace
eRecycle (2019)	Bekasi	Waste Management	Direct recycling and incentivized pickup	App-based collection → Recycle into flakes → Sell to plastic industries
Sungai Design (2025)	Bali	River Clean-Up/Upcycling	River cleanup + plastic furniture production	Collect plastics from rivers → Sort & clean → Upcycle into lawn chairs
Avani Eco (2025)	Bali	Alternative Bioplastics	Replace plastics with biodegradable materials	Produce cassava bags, sugarcane containers, corn straws → Commercial sale
Evoware (2024)	Jakarta	Alternative Bioplastics	Replace single-use plastics with seaweed-based packaging	Manufacture cassava & seaweed-based bags, sachets, mailers → Biodegradable & edible materials

Note. Adapted from: F6S, 2024; Sungai Design, 2024; Sutherland, 2017; Evoware, 2024.

These initiatives go beyond basic recycling—they incorporate advanced technologies, sustainable materials such as cassava, seaweed, and cornstarch, and active community participation to create comprehensive and scalable solutions. Many of these companies focus not only on reducing environmental impact but also on raising awareness, generating local employment, and offering eco-conscious alternatives to single-use plastics. Their diverse business models—ranging from mobile apps that facilitate waste exchange to the production of biodegradable packaging—demonstrate a holistic and adaptive approach to sustainability. As such, they represent a vital component of Indonesia's broader strategy for transitioning towards a circular economy. These efforts also serve as pioneering models for other countries in Southeast Asia aiming to implement similar plastic waste reduction frameworks.

Tech-driven apps like eRecycle and E-Loak enhance waste collection and citizen involvement, while sustainable ventures like Sungai Design turn plastic waste into construction materials and furniture. Local initiatives such as Bantubumi and Katingan Mentaya Plastic confront community waste and ecological damage directly through river cleanups. Additionally, biodegradable alternatives from Avani Eco and Evoware, using cassava and seaweed-based materials, offer sustainable substitutes to petroleum-based plastics. These efforts reflect Indonesia's commitment to environmental innovation and serve as models for Southeast Asia in the fight against plastic pollution.

Their success underscores the value of integrating local knowledge, digital tools, and green entrepreneurship into national waste strategies. As more regions adopt similar models, these pioneering efforts could help catalyze a shift toward a more circular and inclusive waste economy across the ASEAN region.

Indonesia's Growing Shift in Plastic Awareness and Action

Public Awareness and Behavior Change: In 2023, 27 cities tested a plastic bag charge, with many residents adapting easily by using alternatives. This showed that preventing plastic waste, through behavior change, leads to long-term benefits (Mafira, 2021).

Role of Advocacy and City Leadership: Advocacy groups are raising awareness about plastic pollution, but emphasize the need for stronger regulations. Cities like Jakarta and Bali have set examples, encouraging others to follow suit (Plastic Diet, 2024).

Innovative Alternatives and Affordability Challenges: Cassava-based bags, introduced by Avani Eco, offer an eco-friendly solution but are too expensive for widespread adoption. Affordability remains a barrier to broader use (Phys.org, 2017).

Research and Government Support: Indonesia is investing in research on marine debris and biodegradable plastics, with increasing government support for eco-startups (AFD, 2024).

Targeting Traditional Markets: Traditional markets, where millions of traders operate, present a key opportunity for change. Subsidizing biodegradable alternatives could drive sustainable habits at scale (Jakarta Globe, 2024).

Laws Paired with Practical Alternatives: Laws alone are insufficient; practical alternatives must accompany regulations to ensure people are empowered to adopt sustainable practices (Wang and Karasik, 2022).

Key Challenges in Addressing Plastic Pollution in Indonesia

- 1) A 2015 UN report noted that cassava starch bags were more expensive (about \$0.03 more than conventional plastic bags) and unlikely to significantly reduce marine litter (Sutherland, 2017).

- 2) By 2024, cassava-based alternatives remained slightly more expensive than traditional plastics, with profit-driven businesses often prioritizing cost over environmental concerns.
- 3) Dietplastik's campaign against plastic pollution gained traction, with cities implementing plastic bans. However, the plastics industry fought back legally, bringing the organization to court. Dietplastik won, with the Supreme Court allowing cities to enforce bans (Gardiner, 2023). Legal challenges may continue.
- 4) While the 3Rs (Reduce, Reuse, Recycle) are crucial for changing habits, the primary focus must be on the source: plastic manufacturing. Dietplastik's legal battle with the plastics industry highlights the long-term struggle for environmental change. The Supreme Court's support signals a positive step, but ongoing government action is needed for effective policy implementation (Gardiner, 2023).

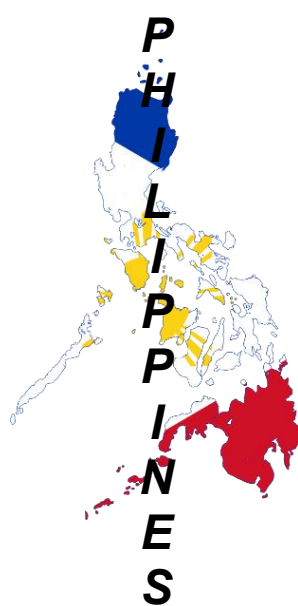
Indonesia has made significant strides in addressing plastic pollution through public awareness, local leadership, and a growing system of sustainable alternatives. Public awareness campaigns—most prominently led by NGOs such as Gerakan Indonesia Diet Kantong Plastik (GIDKP)—have driven behavioral change and directly influenced key regulations, such as the Jakarta Governor's plastic bag ban.

While challenges remain, such as affordability, legal battles, weak integration of the informal sector, infrastructure gaps and low public compliance outside major cities, the country's commitment to sustainable waste management and regulatory reforms is evident. With continued support for eco-startups, stronger enforcement of bans, and a focus on the root causes of plastic waste, Indonesia is positioning itself on the promising path towards becoming a regional model for sustainable plastic waste management in Southeast Asia.

Philippines

Table 9

Policies on the Philippines's Solid Waste Management System

	Laws & Regulations	Roadmaps & Policies
	Republic Act No. 9003 or the “Ecological Solid Waste Management Act of 2000”	Extended Producer Responsibility (EPR) Scheme Assessment for Plastic Packaging Waste in the Philippines
	10 cities in NCR passing ordinances and resolutions on single-use plastics (2003-2019)	
	22 House Bills proposed by DTI (2020)	
	NSWMC Resolution No. 1363, Series of 2020	Roadmap for Phasing out Single-Use Plastics in the Philippines
	House Bill No. 9147 or “Single-Use Plastic Products Regulation Act” (2021)	
	Senate Bill (SB) 1746, or the “Waste to Energy Act,” (2023)	
	Republic Act No. 11898 or the “Extended Producer Responsibility” (EPR) 2023	Zero Waste to Nature: Ambisyon 2030

Note. Adapted from: Congress of the Philippines, 2019; DENR, 2023.

Laws and Regulations

The Ecological Solid Waste Management Act of 2000 was one of the Philippines’ earliest and most comprehensive environmental laws, promoting R&D and outlining roles for various agencies in waste reduction, collection, segregation, and recovery (Congress of the Philippines, 2001). The National Capital Region (NCR) led early action, with 10 of 18 cities enacting local ordinances from 2003 to address single-use plastics (Schachter & Karasik, 2022).

In 2020, the Department of Trade and Industry proposed 22 House Bills targeting all aspects of plastic regulation—from production and sale to recycling, disposal, and penalties (DTI, 2020). That same year, the National Solid Waste Management Commission (NSWMC) issued a resolution banning specific single-

use plastics, including thin plastic bags, straws, stirrers, and utensils, assigning enforcement roles to multiple government agencies (NSWMC, 2020).

The Single-Use Plastic Products Regulation Act (House Bill No. 9147), introduced by the 18th Congress, outlined detailed rules for the regulation and disposal of single-use plastics, including fines for violators (House of Representatives, 2021) and the Waste-to-Energy (WTE) Act (See Appendix A) promotes using incineration to convert plastic waste into energy, reducing landfill use and producing electricity through steam-powered turbines (Abasola, 2023; Guberman, 2021).

Roadmaps and Policies

The EPR Scheme Assessment for Plastic Packaging Waste by WWF aligns with the Extended Producer Responsibility Act of 2023, advocating for a government-monitored recycling system to hold producers accountable for their plastic output (Lacsamana, 2022).

The Roadmap for Phasing Out Single-Use Plastics is a proposed legislative guide focusing on six key areas: reducing plastic use, supporting affected workers and MSMEs, implementing producer responsibility, promoting alternatives, raising awareness, and offering incentives (One Planet, 2022).

The Zero Waste to Nature: Ambisyon 2030 roadmap, NGO-led but government-supported, aims to build a circular economy by promoting recyclable packaging, securing funding for waste recovery, and phasing out non-recyclable plastics (PARMS, 2023).

These roadmaps reflect growing collaboration between the Philippine government and civil society to combat plastic pollution more effectively. Moreover, in 2023, a law was passed mandating businesses with assets over P100M to

assume full responsibility for the entire life cycle of their plastic waste. Republic Act No. 11898 or the “Extended Producer Responsibility” states that “those who bring plastic packaging into the Philippine market must pay for the cost of waste prevention, clean up, and recovery measures.” This law also encourages SMEs to voluntarily join the program (Sur, et al, 2023).

Public Consciousness

The Philippines presents a paradox in its fight against plastic pollution: a robust legal framework exists, yet its practical implementation often falls short. A key criticism, as observed by Ramos (2023), is the significant gap between policy design and enforcement. Laws such as the Ecological Solid Waste Management Act (RA 9003) and other national policies provide clear guidelines for managing waste, promoting recycling, and reducing plastic consumption. However, inconsistent political will, overlapping mandates across government agencies, and a lack of funding and logistical support have hampered effective execution. As a result, while legislation may appear progressive on paper, its real-world impact remains limited and fragmented.

Nonetheless, isolated examples of effective environmental governance offer a glimpse into what is possible with strong leadership and political resolve. President Rodrigo Duterte’s 2018 closure of Boracay Island—a major tourist destination—demonstrated that national-level action could yield quick, tangible improvements. Similarly, the 2019 Manila Bay rehabilitation initiative (MMDA, 2019), and former Mayor Francisco Domagoso’s city-wide clean-up campaigns in Manila from 2019 to 2022 mobilized local communities and government units toward visible environmental gains (Oxford Business Group, n.d.; Montemayor, 2019). These efforts, while commendable, underscore a crucial point: without a sustained,

nationwide strategy, such initiatives remain short-lived and geographically limited. Lasting impact involves moving beyond reactive clean-up operations and investing in long-term systems for enforcement, capacity-building, and cross-sectoral collaboration.

Successes

The Philippines made a major stride in 2018 by banning plastic waste imports, resulting in a 50% reduction in national plastic waste and easing the burden on the country's limited and underdeveloped recycling infrastructure (Ramos, 2023). The implementation of the Ecological Solid Waste Management Act also contributed to a 50% decrease in plastic leakage at key ports, strengthening waste management systems at critical entry and exit points (WWF, 2023). In addition, several major food chains joined the movement by phasing out plastic straws and adopting more sustainable alternatives in compliance with growing environmental awareness and consumer pressure (SSE, 2022). A notable milestone in environmental governance is the ongoing rehabilitation of Manila Bay. This large-scale cleanup and restoration effort has not only aimed to improve water quality and ecosystem health but also serves as a public symbol of the government's commitment to environmental stewardship and long-term sustainability.

Failures

Many of the Philippines' successes in plastic waste reduction were preceded by persistent failures—some of which remain unresolved. A key issue is the reliance on short-term “false solutions” that appear effective but fail to address root causes (see page 88). Despite well-drafted laws, poor enforcement, weak infrastructure, and a lack of sustainable planning undermine progress.

A major challenge is the “sachet economy”, driven by poverty and consumer demand for affordable goods in small, single-use packaging. These laminated sachets are unrecyclable, yet remain widespread, contributing heavily to plastic pollution (Lema, 2019; World Bank, 2021). Many local governments lack the capacity or resources to implement national directives on plastic waste, resulting in inconsistent action across regions. Furthermore, public-private partnerships intended to support waste recovery have often been short-lived or poorly monitored, failing to deliver long-term impact. Efforts to address this, such as daily cleanups and the Extended Producer Responsibility (EPR) Law, have fallen short. EPR implementation has been weak, with many companies failing to meet obligations, reducing what should be a legal mandate to a voluntary suggestion (Howell, 2023).

Emerging Companies

The Philippines has experienced a notable increase in environmentally focused startup enterprises actively addressing plastic pollution and enhancing grassroots engagement in sustainable waste management practices. These emerging ventures are developing scalable solutions that offer viable alternatives to single-use plastics, advance circular economy models, and contribute to public education and behavioral change. Many of these startups leverage localized innovation to adapt their strategies to community-specific challenges, thus ensuring relevance and impact. Additionally, several initiatives foster partnerships with informal waste sectors and local government units to expand waste diversion efforts and promote inclusive environmental governance. These startups not only bridge gaps in formal infrastructure but also act as catalysts in shifting consumer behavior toward more sustainable practices. Table 10 presents a list of such initiatives operating across various regions in the Philippines.

Table 10*Companies focused on Plastic Waste Mitigation*

Startup/ Initiative	Location	Type	Purpose	Method/Approach
Green Antz Builders Green Antz (2024), MB (2024)	Plaridel, Bulacan	Waste Management / Construction	Circular economy through eco-bricks	Shred plastic waste → Mix with cement → Mold into high-strength bricks for low-cost housing
JuanBag Villgro (2020)	Makati	Waste Recovery / Upcycling	Reuse & upcycle delivery plastics	Collect used packaging from buyers → Return for reuse or upcycle into bags
Envirotech Envirotech (2021)	Davao City	Waste Management / Upcycling	Converting plastic waste into furniture	Collect plastic waste → Process into chairs, benches, bricks, etc.
Trash to Cashback Manila Bulletin (2024)	Quezon City	Waste Incentivization	Incentivize plastic collection for utility credits	Exchange recyclables for environmental points → Redeem via utility payment app
Aling Tindera Generation Hope (2024)	Manila, Pasig, Cebu	Community-Based Waste Collection	Divert plastic waste while empowering women-led SMEs	Local hubs collect clean plastic waste → Monetize → Provide community income
Plastic Flamingo (2024)	Muntinlupa	Waste Management / Furniture Design	Convert waterborne plastic waste into durable furniture	Collect plastic → Upcycle into colorful furniture, shelters, custom designs
Holcim Philippines (2018)	Taguig	Construction / Alternative Use	Co-processing from non-recyclable plastic waste into alternative fuel for cement production	Use Geocycle unit → Co-process plastic waste into cement furnaces
Ecolutions (2023)	Manila	Bioplastics / Food Packaging	Promote biodegradable packaging alternatives	Use sugarcane bagasse & bamboo → Oven/microwave safe → Decomposes in 3 months
SACHI-Group Inc. (2021)	Bulacan	Bioplastics / Packaging	Replace petroleum-based plastics with cassava bags	Manufacture customizable, plant-based, compostable single-use bags

Note. Alternative companies mostly located around the capital and its suburbs.

Innovative Approaches to Plastic Waste in the Philippines

Emerging Circular Economy: The concept of circular economy is gradually gaining traction in the Philippines. Companies like Holcim are integrating plastic waste into industrial processes, though stricter government pressure is needed to push other plastic-heavy industries to follow suit (Holcim, 2018).

Plastic as Profit: Filipino entrepreneurs are discovering the value of plastic waste. Durable plastics are being repurposed into outdoor furniture, with materials collected from waterways processed into plastic chips and filaments—reducing pollution while generating income (SACHI-Group Inc., 2021; Ecolutions, 2023).

Incentivized Waste Recovery: Programs like Trash to Cashback in Quezon City showcase how plastic waste can be exchanged for utility credits. With the right partnerships and scaling, this model can serve both environmental and socio-economic goals, especially for low-income communities (Trash to Cashback, 2023).

Effective Plastic Restrictions: Banning single-use plastics is feasible if the government:

- 1) **Supports with Sustainable Alternatives:** As done in Chile (Solubag™) and Israel (Solutum™), alternatives that dissolve in water make bans more acceptable and effective (Kitson, 2018; Barr, 2019);
- 2) **Incentivizes Segregation:** Expanding programs like Trash to Cashback can build a recycling culture through rewards and community engagement (Trash to Cashback, 2023).
- 3) **Invests in Infrastructure:** Large-scale investment is needed to enhance waste collection and build advanced recycling facilities. Though costly, this can yield economic returns by producing materials for manufacturing (AlphaBeta, 2021).

Key Challenges in Addressing Plastic Pollution in the Philippines

- 1) Lack of Government Drive: Government efforts are mostly limited to one-time clean-up drives without long-term sustainability. Unlike Indonesia, there are no consistent local incentives for anti-plastic initiatives. Support largely comes from international groups. While the Extended Producer Responsibility Law offers tax incentives for companies managing their own plastic waste, public awareness and registration remain low (Crismundo, 2024; Howell, 2024; DENR, 2023).
- 2) Poor Waste Segregation Enforcement: Waste segregation is weakly promoted and rarely enforced. Government campaigns are sporadic, and segregation is treated as optional. Informal waste pickers sort trash but ignore dirty, single-use plastics—leaving behind the most harmful waste (Manas, 2023; Hasan, 2021).
- 3) Decline of Single-Use Plastic Bans: Though initially popular, bans on single-use plastics have lost momentum due to poor implementation and flawed alternatives like paper bags, which are inconvenient, fragile, require logging, and degrade slowly when not properly disposed of (Ubando et al., 2024).
- 4) Unregulated Online Shopping Waste: The rise of e-commerce has led to excessive plastic packaging. With no regulation, plastic waste from online purchases continues to grow unchecked. Consumers demand well-packaged goods, but the resulting waste ends up in landfills (dela Peña, 2021).

Restrictions will only be effective if paired with sustainable alternatives, incentives, strong infrastructure, and rigorous implementation (Francisco, 2025).

Insights

Table 11 presents key insights from the data, organized into initial codes and grouped under four thematic categories. Each entry includes specific examples from Indonesia and the Philippines.

Table 11

Coding Matrix and Grouping

Initial Code	Description/Indicators	Thematic Category	Example/Case
Policy gaps (Manila Bulletin, 2024)	Inconsistencies or shortcomings in existing policies and regulations addressing plastic waste management	Policies and Regulations	Lack of recycling infrastructure in the Philippines as highlighted by DENR
Local ordinance integration (Ramos, 2025)	Implementation of municipal or barangay-level regulations complementing national policies	Policies and Regulations	Barangay-led waste management initiatives in the Philippines
Gradual policy implementation (Greenpeace, 2021)	Phased introduction of regulations to allow adaptation by stakeholders	Policies and Regulations	Step-by-step enforcement of plastic bans in various regions of the Philippines
Waste segregation (Diani, 2022)	Household-level sorting of waste materials to facilitate recycling and proper disposal	Community Management and Capacity Development	Eco-School Program promoting waste segregation among students in Davao City
Informal sector involvement (Douma, 2024)	Engagement of waste pickers and informal workers in waste collection and recycling processes	Community Management and Capacity Development	Integration of informal waste workers in Indonesia's recycling supply chain
Community-led initiatives (Defitri, 2022)	Grassroots movements and programs initiated by local communities to address plastic waste	Community Management and Capacity Development	Community-operated waste banks in Indonesia offering economic incentives and raise awareness
Material recovery facilities (MRFs) (Manila Bulletin, 2024)	Establishment of facilities for sorting and processing recyclable materials	Innovations and Technology	Development of MRFs in various municipalities in the Philippines for a decentralized waste management strategy
Biodegradable substitution (The Guardian, 2025)	Adoption of alternative materials to replace single-use plastics	Innovations and Technology	Use of biodegradable materials in packaging by local businesses in Indonesia
NGO-government partnerships (Ramos, 2025)	Collaborative efforts between non-governmental organizations and government agencies in waste management initiatives	Partnerships and Collaborations	Joint programs by NGOs and local governments in the Philippines to promote zero-waste practices

Initial Code	Description/Indicators	Thematic Category	Example/Case
Stakeholder collaboration (Letcher, 2020)	Engagement of multiple stakeholders, including private sector, government, and civil society, in waste management efforts	Partnerships and Collaborations	Multi-stakeholder approach in Indonesia's waste management strategies
Community incentive (Reuters, 2024)	Reward-based programs encouraging waste collection through tangible benefits	Behavioral and Cultural Outcomes	Rice-for-trash initiative in Mabini, Batangas, Philippines
Behavior change campaigns (Diani, 2022)	Initiatives aimed at altering public behavior towards plastic use and disposal	Behavioral and Cultural Outcomes	Awareness campaigns conducted in schools and communities in the Philippines
Public education & awareness (Diani, 2022)	Educational campaigns and programs aimed at increasing public understanding of plastic waste issues	Behavioral and Cultural Outcomes	Eco-School Program's interactive classes on marine plastic debris in the Philippines
Low-income engagement strategies (Reuters, 2024)	Programs designed to involve and benefit low-income communities in waste management efforts	Behavioral and Cultural Outcomes	Rice-for-trash program supporting low-income families in the Philippines

Note. Codes were grouped according to the 5 key areas from this study.

Table 11 reveals that successful plastic waste interventions often emerge where local knowledge, inclusive engagement, and innovation intersect. Projects that emphasize community capacity—whether through education, incentives, or local leadership—tend to generate more sustainable results than those relying solely on policy mandates. Across both countries, the emphasis on culturally embedded practices, such as barangay-level recovery systems or riverbank cleanup projects, reflects the importance of designing solutions that resonate with everyday realities. These patterns suggest that addressing plastic waste is not merely a technical challenge but a deeply social one, shaped by trust, habit, and access.

In parallel, the growing role of digital tools and alternative materials points to a shift toward decentralized, scalable innovation. Initiatives that link individuals

directly to the recycling economy—through mobile apps, cash-back programs, or bio-based packaging—demonstrate how technology can amplify participation without displacing traditional systems. The data highlights that while government regulation plays an important enabling role, it is the adaptive, hybrid models—blending grassroots action with modern solutions—that offer the most promise for long-term impact. These insights affirm the need for flexible, integrated strategies that acknowledge both structural constraints and the potential of community-driven change.

Table 12 presents the synthesized key findings derived from the qualitative analysis of plastic waste management in Indonesia and the Philippines. The findings are systematically grouped under the five major analytical categories of this research. Each main category is further supported by subthemes and real-world examples drawn from both countries, showcasing how policies translate into practice, how local actors implement programs, and how grassroots behaviors contribute to or hinder progress. This structured presentation allows for a nuanced understanding of the multi-layered interactions among government bodies, private sector actors, civil society, and local communities, providing a clear foundation for drawing comparative insights and formulating targeted policy recommendations.

Moreover, Table 12 plays a crucial role in connecting the research findings to the study's overarching analytical framework and serves as a diagnostic tool to identify opportunities for policy transfer, cross-sector collaboration, and future intervention. The thematic organization provides a clear view of how systemic and behavioral factors intersect, and it reinforces the conclusion that effective plastic waste management requires an integrated approach involving regulation, innovation, community engagement, and cultural change. This table thus functions as a pivotal

summary that encapsulates the essence of the research and guides the direction for evidence-based recommendations in subsequent chapters.

Table 12

Expanded Themes and Subthemes

Main Theme	Subthemes	Examples/Indicators
1. Policies and Regulations	National and local alignment	Integration of barangay-level ordinances with national plastic bans (Philippines) (Braganza, 2017)
	Gradual implementation of bans	Step-by-step policy rollout to allow adaptation by businesses and consumers (Braganza, 2017)
	Enforcement mechanisms	Role of LGUs and task forces in monitoring compliance (Rola, 2020)
	Policy gaps	Limited infrastructure/unclear guidelines hindering implementation (Rola, 2020)
	Plastic offsetting frameworks	Extended producer responsibility and credit systems (PCX Solutions, 2024)
2. Community Management and Capacity Development	Informal sector integration	Engagement of waste pickers and local cooperatives in waste recovery and segregation (RILHUB, 2020)
	Grassroots organizing	Waste banks, sorting hubs, and community-led programs (No Burn, 2024)
	Local leadership	Community leaders promoting local rules and awareness (No Burn, 2024)
	Educational capacity	Workshops, training, and environmental education for citizens (No Burn, 2024)
	Peer-to-peer accountability	Enforcement of sorting rules and participation incentives (No Burn, 2024)
3. Innovations and Technology	Digital collection platforms	Apps like Octopus or E-Loak linking recyclers to households (New Security Beat, 2021)
	Biodegradable substitutes	Cassava-based bags, bamboo utensils, seaweed packaging (Oikos PH, 2025; EcoNest PH, 2025)
	Upcycling technology	Converting plastic waste into furniture, bricks, eco-bags (The PlaF, 2025)
	Mobile recycling services	Traveling MRFs and waste pick-up schemes in remote communities (No Burn, 2024)
	Materials recovery infrastructure	MRFs in cities and municipalities for processing and resale (No Burn, 2024)

Main Theme	Subthemes	Examples/Indicators
4. Partnerships and Collaborations	NGO-government alliances	Joint efforts on education, segregation, and zero-waste campaigns (No Burn, 2024)
	Public-private partnerships	Corporations funding or participating in local recycling and recovery efforts (PCX Solutions, 2024)
	Academic and research collaboration	University studies informing local plastic audits and solutions (UP CIDS, 2025)
	Cross-border or regional cooperation	ASEAN-level dialogues and pilot projects on plastic waste reduction (PCX Solutions, 2024)
	Supply chain involvement	Engaging producers, retailers, and logistics companies in take-back schemes (PCX Solutions, 2024)
	Incentivized participation	Rice-for-trash or point-based systems (e.g., Trash to Cashback) (Trash to Cashback, 2025)
5. Behavioral and Cultural Outcomes	Visible role models	Local leaders and influencers modeling sustainable behaviors (No Burn, 2024)
	Social norms and stigma	Increasing disapproval of plastic littering; normalization of reusable bags (No Burn, 2024)
	Habit-forming interventions	Refill stations, discounts for bring-your-own-container practices (Heinrich Böll Stiftung, 2020)
	Emotional and identity ties to nature	Cultural values tied to stewardship of rivers, beaches, and sacred spaces (No Burn, 2024)

Note. Events tied to the 5 categories is key in understanding the possibilities when other such instances are replicated in other areas.

This thematic matrix reveals that while both Indonesia and the Philippines are burdened by similar challenges in plastic waste management, their responses showcase a rich tapestry of local ingenuity, cultural adaptation, and grassroots-driven innovation. The data suggests that non-regulatory practices—particularly those grounded in community engagement, circular economy models, and locally adapted technologies—often succeed where top-down approaches encounter limitations. These initiatives demonstrate that effective solutions do not always

require sweeping legislation, but instead thrive on the alignment of shared values, localized knowledge, and sustained public participation.

Furthermore, the matrix uncovers a strong trend toward hybrid models—where technological innovation, such as digital waste platforms, is seamlessly blended with community-based education and reward systems. This convergence of traditional practices and modern tools reflects an evolving socio-cultural landscape where behavioral change is both a goal and a strategy. The data also underscores the importance of informal networks and social capital in facilitating plastic recovery and reuse, especially in areas underserved by formal infrastructure. Overall, the findings highlight the potential for these practices to complement regulatory frameworks, providing scalable, inclusive pathways that are not only environmentally sound but also socially empowering.

Chapter V

DISCUSSION

This study analyzed how each country addresses plastic pollution across five thematic areas, emphasizing strengths and identifying gaps in community initiatives and non-regulatory practices.

Table 13 outlines the implementation of national and local efforts in Indonesia and the Philippines for plastic and solid waste management.

Table 13

Comparison of Implemented Decrees and Regulation

Category	Indonesia	Philippines
General Solid Waste Law	Solid Waste Management Act (No. 18/2008)	Republic Act No. 9003 – <i>Ecological Solid Waste Management Act of 2000</i>
3Rs/ Waste Bank Regulation	MoEF Decree No. 13/2012 – <i>Guidelines for Implementation of Reduce, Reuse, Recycle through Waste Bank</i>	NSWMC Resolution No. 1363, Series of 2020 – <i>Encourages LGUs to establish ecological centers</i>
Plastic Excise/Tax Policy	Government Regulation on Excise on Plastic (Plastic Bag Tax 2016 & 2018)	22 House Bills proposed by DTI on plastic regulation (2020)
Local Plastic Ban Regulations	Pergub Bali No. 97/2018 (Ban on single-use plastics) - Governor Regulation No. 142/2019	10 cities in NCR passed ordinances on single-use plastics (2003–2019) - House Bill No. 9147 (2021)
Plastic Bag Restrictions	Governor Regulation No. 142/2019 – <i>Obligation to Use Eco-friendly Bags in Retail</i>	House Bill No. 9147 – <i>Single-Use Plastic Products Regulation Act</i> (2021)
Extended Producer Responsibility	Ministerial Regulation No. 75/2019 – <i>EPR Policy Implementation</i>	Republic Act No. 11898 – <i>Extended Producer Responsibility Act</i> (2023)
Waste-to-Energy	Presidential Regulation No. 35 of 2018	Senate Bill No. 1746 – <i>Waste to Energy Act</i> (2023)

Note. Adapted from: MoEF, 2022; Congress of the Philippines

These legislative frameworks—including Indonesia’s Solid Waste Management Act of 2008 and the Philippines’ Ecological Solid Waste Management Act of 2000—were designed to promote systematic waste reduction, proper segregation, recycling, and environmental protection across all levels of society.

Key Areas of the Solid Waste Management Act

The Philippines’ Ecological Solid Waste Management Act of 2000 predates Indonesia’s Solid Waste Management Act by eight years. While both laws address pollution broadly, they share similar goals: promoting research, community involvement, and the 3Rs (Reduce, Reuse, Recycle). However, Indonesia’s law stands out by including explicit guidelines on financing, infrastructure development, and clearly assigning responsibilities to specific government agencies (House of Representatives – Indonesia, 2008; Congress of the Philippines, 2000).

Indonesia’s 2008 Solid Waste Management Act provided a comprehensive framework to address the country’s growing waste problem. However, nearly two decades later, implementation has fallen short. Persistent issues like unmanaged dump sites, inadequate recycling efforts, and the surge in packaging waste from online shopping and e-commerce facilities remain unresolved. While the law was thorough on paper, its execution has not kept pace with the country’s evolving waste challenges (Wang and Karasik, 2022).

Similarly, the Philippines enacted the Ecological Solid Waste Management Act in 2000—eight years earlier than Indonesia’s law. This early action should have positioned the country ahead in terms of results. Yet, after nearly 25 years, the law’s impact remains limited. Although it promotes segregation, recycling, and community participation, progress has been stunted by weak enforcement, insufficient infrastructure, and a lack of sustained public awareness (COA, 2023).

Table 14*Comparison of Solid Management Acts*

Indonesia Solid Waste Management Act (No. 18/2008)	Philippines Ecological Solid Waste Management Act of 2000
Overall national education and development of public awareness on waste management	General overall protection of public health and environment
Specified roles of government agencies and coordination with shareholders and private individuals	Guidelines for proper segregation, collection, transport, storage, treatment and disposal of waste while promoting ecological sustainability
Research and development of technology to reduce and handle waste	Research and development to improve waste management systems
Directive to facilitate, develop and conduct efforts to reduce, reuse, recycle and utilize waste	Encourage greater private sector to participate in ecologically sound solid waste management processes
Application of localized technology to meet the needs of a certain locality in reducing and handling waste	Enforce responsibility and accountability for all LGUs and guaranteeing cooperation between stakeholders
Implementation of the proper process of waste segregation, collection, transportation and processing	Institutionalization and strengthening of public participation of SWM implementation
Complete prohibition of open dump sites and provision of facilities and infrastructure for waste management	Advises good resource conservation and recovery for private sector and all shareholders
Enhancement of benefits from waste management outcome	Establishment of the NSWMC to oversee waste management
Regulation for financing, compensation and penalties	A general mandate for LGUs to reduce waste by 25%

Note. Adapted from: House of Representatives – Indonesia, 2008; Congress of the Philippines, 2000.

Four recurring factors hinder the progress of plastic waste management in both Indonesia and the Philippines: low public awareness, inadequate infrastructure, weak implementation (Apriadi et al., 2022), and rapid economic growth (Trotsenberg and Lim, 2022). The Commission on Audit (2023) attributes *poor enforcement and compliance to political, financial, and technical limitations faced by local government*

units and implementing bodies. These challenges are further compounded by competing development priorities, where environmental policies are often deprioritized in favor of short-term economic gains. In many areas, the lack of reliable data on plastic generation and leakage also hampers evidence-based policy-making and effective monitoring. Moreover, coordination between national and local levels remains fragmented, resulting in duplication of efforts or gaps in responsibility, which weakens the overall policy response (Apriadi et al., 2022; Trotsenberg and Lim, 2022).

Economic growth, while beneficial, often complicates efforts to curb plastic pollution. *Governments tend to prioritize immediate demands like employment generation, industrial expansion, and urban development, pushing long-term solutions—such as recycling infrastructure and public education—aside.* As a result, critical long-term investments in circular economy systems seen as capital-intensive with delayed return on investments, receive limited funding and attention. (Apriadi et al., 2022; Trotsenberg and Lim, 2022).

Table 15 describes local regulations in both countries largely focusing on banning plastics and encouraging producer responsibility. However, these laws often fall short in practice due to unsustainable alternatives (COA, 2023; Recycle, 2024); weak enforcement (Apriadi, et. al., 2022; COA, 2023); shifting pollution burden from one source to another (Recycle, 2024); consumer inconvenience (The Conversation, 2023); and economic impact concerns (Jayaprakash, 2022). While many bans start with strong publicity, they lose momentum over time. Recurring issues: limited sustainable substitutes, poor and inconsistent implementation, shifting the pollution burden, inconvenience to consumers, and economic concerns (UN Environment Programme, 2023).

Supplemental Regulations on Plastic Waste Management

Table 15

Comparison of other regulations

Category	Indonesia	Philippines
3Rs (Reduce, Reuse, Recycle)	MoEF Decree No. 13/2012 – Guidelines for 3R implementation through Waste Banks	10 NCR cities passed local ordinances on single-use plastic (2003–2019)
Plastic Taxation	Government Regulation on Excise on Plastic – Plastic Bag Tax (2016 and 2018)	22 House Bills proposed by DTI focused on plastic waste (2020)
Local/Regional Bans	Pergub Bali No. 97/2018 – Local ban on single-use plastics	NSWMC Resolution No. 1363, Series of 2020 – Guidelines on Single-Use Plastics
Sustainable Packaging	Governor Regulation No. 142/2019 – Use of environmentally friendly shopping bags	House Bill No. 9147 – “Single-Use Plastic Products Regulation Act” (2021)
Waste-to-Energy	(Currently guided by Presidential Decrees and MoEF Circulars, not yet a national law)	Senate Bill No. 1746 – “Waste to Energy Act” (2023)
Extended Producer Responsibility (EPR)	MoEF Policy on Plastic Waste Management (includes EPR principles)	Republic Act No. 11898 – “Extended Producer Responsibility Act” (2023)

Note. Adapted from: MoEF, 2021; DENR, 2023.

Pollution rarely ranks as an urgent priority due to the high costs involved, the extensive education required, and the delayed visibility of results which are often measurable only after substantial recycling infrastructure investments are made. While both governments continue to draft policies and set long-term targets, implementation is often hindered by fragmented institutional efforts and low public participation. Consequently, well-drafted laws struggle to produce lasting change without coordinated execution and sustained citizen involvement. In many cases, policies remain aspirational rather than actionable, with limited mechanisms for monitoring or stakeholder accountability (UN Environment Programme, 2023).

Table 16

Other roadmaps and policies

Country	Indonesia	Philippines
Roadmaps	NPAP Indonesia: Policy Roadmap to Radically Reduce Plastic	Extended Producer Responsibility (EPR) Scheme Assessment for Plastic Packaging Waste in the Philippines
& Policies	Presidential Regulation No. 83/2018 on Marine Debris Management MoEF Decree No. P.75/2019 on Roadmap to Waste Reduction by Producer	Zero Waste to Nature: Ambisyon 2030 Roadmap for Phasing out Single-Use Plastics in the Philippines

Note. Adapted from: MoEF, 2021; DENR, 2023.

Indonesia’s Policy Roadmap to Radically Reduce Plastic assigns clear roles to government agencies, the private sector, and even international partners like the Netherlands. It outlines phased targets from 2 to 10 years, aiming for measurable progress by 2030, with a strong focus on collaboration, education, and accountability across sectors (MoEF, 2021).

Indonesia has made notable strides in addressing plastic waste, yet several policy gaps initially hindered progress. These gaps were later identified and met with structured recommendations and action plans. A key element of Indonesia’s policy framework is the government’s urgent call for shareholder cooperation to actively support and expedite policy implementation. However, challenges in execution and consistency remain barriers to progress. As in many countries, Indonesia places the burden of plastic waste reduction on companies and manufacturers, holding them accountable for their own waste (MoEF, 2019). The government introduced a plastic credit system, allowing companies to offset their waste generation through investments in recycling infrastructure and pollution mitigation (IBCSD, 2023).

Marine health is also a priority. Presidential Regulation No. 83/2018 mandates 18 ministries to manage marine debris, focusing on its recovery and recycling (Damayanti, 2024). Though early outcomes have been positive, full effectiveness is still under review as the 2025 target approaches (Wang & Karasik, 2022).

The Philippines enacted the Extended Producer Responsibility (EPR) Act of 2022, amending the Ecological Solid Waste Management Act of 2000 to address escalating plastic pollution. The law emphasizes corporate accountability for product end-of-life and waste generation, aligning with modern consumer behavior and technological trends.

In support, the Philippine Alliance for Recycling and Materials Sustainability (PARMS) launched the “Zero Waste to Nature: Ambisyon 2030” roadmap, targeting sustainable waste practices. Its key pillars include promoting consistent waste management habits, grassroots recycling advocacy, developing a circular economy, and enforcing EPR compliance through penalties and incentives (PARMS, 2025).

PARMS collaborates with companies to implement EPR through three phases: preparing businesses for circularity, financing waste recovery systems, and investing in recycling infrastructure. The Fast-Moving Consumer Goods (FMCG) sector is actively participating, and projections estimate the creation of 4,000 green jobs and Php 5.2 billion in annual revenue from an initial Php 15.1 billion investment in waste facilities (PARMS, 2025).

Table 17 describes the actions that each country has taken. The gap between policy design and practical implementation remains a key barrier to achieving long-term sustainability in plastic waste management, which highlights the need for a stronger and measurable on-the-ground impact.

Table 17

Successes and Failures of Policies

Country	Indonesia	Philippines
	Decrease of plastic usage after the implementations of plastic bans, most notably in the use of drinking straws and plastic bags pre-pandemic, especially in areas where enforcement has been strict. Many have shifted to the use of reusable bags. However, production still remains high and is even expected to double before 2050.	
Successes	15.3% decrease in plastic waste Construction of waste processing facilities in small islands Successful partnership with Dietplastik Decentralization of 3Rs Heavy levies and fines that proved unsustainable	Plastic import bans in 2018 50% decrease in plastic waste in ports Mid-level success in elimination of plastic straws Maintenance of Manila Bay Prevalence of false solutions
Failures	Lack of planning but forceful and unsustainable implementation Lack of significant strengthening for enforcements and reinforcements Inefficiency of practical, effective and sustainable methods that would confront plastic pollution at its very core Lack of government investments in modern recycling facilities and other related infrastructure Recycling methods handled by unlicensed informal sectors Inadequate waste segregation habits Lack of education and public awareness on 3Rs, waste segregation and waste recovery Lethargic implementation of laws and regulations On/off political will and focus on plastic pollution	Excellent regulations but no firm and continuous implementation

Note. Adapted from: MoEF, 2021; Wang and Karasik, 2022; DENR, 2023; Greenpeace, 2024.

Indonesia and the Philippines have strengthened policies to hold producers accountable and promote sustainable plastic waste management. Both focus on circular economy and pollution reduction with targets set for 2025 and 2030 (MoEF, 2021; DENR, 2023). While progress depends heavily on effective implementation, these policies lay a strong foundation for reducing plastic waste and fostering environmental sustainability in both countries.

Community Management and Capacity Development

Both Indonesia and the Philippines have experienced a mix of successes and challenges in implementing plastic pollution policies, as reflected in studies and reports. Both countries have effectively partnered with NGOs and private sectors, increasing awareness about Extended Producer Responsibility among companies (See Appendix B). Some localized progress is evident, such as Indonesia's development of recycling facilities in the western regions and reductions in plastic waste in Philippine ports. Larger cities and smaller areas with manageable waste systems have also seen better waste control (MoEF, 2020; Business World, 2021).

Despite these efforts, both countries have constantly struggled to meet their targets, with tangible, sustainable outcomes remaining limited. Much of their approach has focused on managing the effects of plastic pollution rather than addressing its root causes (Wang and Karasik, 2022). Community involvement through clean-ups and awareness campaigns have been encouraged, but when such programs become the main strategy and solutions revolve around community engagement, it falls short of resolving the core issues, thus becoming a false solution—shifting responsibility away from producers and systemic reform, and allowing plastic pollution to persist (Greenpeace, 2024).

1) **Clean-up campaigns**, while beneficial for short-term environmental relief, are ultimately reactive measures that do not address the underlying causes of plastic pollution. These efforts often lack sustainability, as plastics continuously reaccumulate due to deeply rooted behaviors such as habitual littering, inadequate waste infrastructure, and a general lack of environmental awareness. Without government intervention in plastic manufacture and accessible waste disposal alternatives, the root problem persists (Greenpeace, 2024).

- 2) **Plastic offsetting**—where companies invest in recycling facilities to counterbalance their plastic production—shifts responsibility rather than solves the problem. It allows companies to “buy” compliance without reducing actual plastic output, and the limited number of recycling facilities highlights the inadequacy of this approach, with most efforts driven by a few private entities and NGOs (Greenpeace, 2024).
- 3) **Recycling**, though necessary, addresses symptoms rather than causes. Both Indonesia and the Philippines face insufficient recycling infrastructure, poor waste collection and sorting, and an overwhelming volume of non-recyclable plastics. The issues of overproduction and overconsumption remain unaddressed, placing excessive strain on recycling systems (Greenpeace, 2024; Beyond Plastics, 2025).
- 4) **Plastic bans** often fail without sustainable alternatives. Both countries have seen bans rise and fall repeatedly, especially as consumer habits shifted during and after the pandemic. The surge in single-use cups further undermines these efforts. Additionally, substituting plastics with paper products shifts environmental burdens onto forests instead of directly targeting plastic producers (Greenpeace, 2024; Beyond Plastics, 2025).

Pages 78–80 enumerate key insights on how to effectively engage all levels of the community in plastic waste management. While both Indonesia and the Philippines still have five years remaining in the implementation of their respective roadmaps and policies, mere continuation of current efforts will not be enough. Without urgent and transformative action that directly addresses the root causes of plastic pollution—such as unsustainable production, over-reliance on single-use plastics, and weak enforcement—progress will remain slow and fragmented and the

region risks falling short of its environmental targets despite well-meaning frameworks already in place. (The World Bank, 2021; IPEN, 2022; NPAP, 2022; Earth.Org, 2023)

Innovations and Technology

In response to the global plastic crisis, innovation and technology have become critical drivers of change. From the development of biodegradable alternatives and advanced recycling systems to digital waste tracking and AI-powered sorting technologies, these solutions aim to minimize environmental impact while improving waste recovery efficiency.

Table 18 provides a comparative overview of emerging startup companies that are making significant contributions to addressing the plastic pollution crisis in both countries. These enterprises demonstrate a range of innovative approaches—from biodegradable material development to circular economy-based collection and reuse systems—targeting different points in the plastic value chain. While many of these initiatives offer interim or downstream solutions, such as recycling and product substitution, it remains imperative for governments and industry stakeholders to simultaneously confront the upstream drivers of the crisis—particularly plastic manufacturing companies, the overproduction of virgin plastics and the linear design of packaging and products.

Despite their limitations in operational scale, these sustainability-focused startups play a critical catalytic role by introducing disruptive technologies, piloting scalable models, and shifting consumer behavior through awareness and engagement. The growing presence of sustainability-oriented ventures reflects a broader shift in sectoral priorities, wherein environmental sustainability is increasingly embedded into business strategies, research, and policy frameworks.

Table 18

Innovative Companies and Technological Transformation

Country	Indonesia	Philippines
Startups/ Initiatives	Rebricks (2025): Conversion of plastic waste into construction materials and promoting circular economy practices	Green Antz Builders (2014): Integrating circular economy models; converts plastic waste into building materials
	Bantubumi : Recycling locally-sourced plastic into high-quality raw materials (Marsudi, 2021)	The Plastic Bank (2025): Collection of plastic waste from individuals in exchange for rewards
	Satu Bumi (2025): Community partnerships promoting waste segregation and plastic recycling	JuanBag : Recovery of plastic waste and transforming them into reusable eco-bags (Zarah Juan, 2025)
	Katingan Mentaya Plastic (2018): Management of plastic waste along local riverbanks and recycling recovered waste	Envirotech (2021): Conversion of plastic waste recovered into outdoor furniture such as park benches, picnic tables, etc.
	E-Loak (2015): App for selling non-biodegradable wastes for recycling	Trash to Cashback (2023): Program converting plastic waste into points redeemable for utility payments.
	PT. Eco Plastika (2025): Provides alternatives for food packaging solutions to single-use plastics that is eco-friendly	Oikos PH (2025): Manufactures innovative and sustainable plastic solutions; reducing reliance on petroleum based materials
	PlasticPay (2025): Incentivizes individuals who collect and recycle plastic waste in the form of digital currency or credits	Plastic Credit Exchange (PCX) : Enables companies to invest in plastic recycling to offset their carbon footprint. (PCX Markets, 2025)
	eRecycle (2019): Purchases post-consumer waste from producer and processes materials within their own recycling and recovery facilities	Aling Tindera (2025): Community-based waste-to-cash initiative to divert plastic waste from the environment through localized collection and exchange systems
	Daur Ulang Plastik : Upcycling materials into reusable raw materials and sold to different industries (ADUPI, 2015)	Holcim Philippines Inc. (2024): Co-processing through recovered unrecyclable plastic waste and uses it in cement production
	Katalis Digital (2021): Promotes sustainable waste management communities and organizations using digital platforms	EcoWaste Coalition (2022): Advocates sustainable waste management, proper recycling, and plastic reduction.
	Sungai Design (2025): River cleanup and recovery of plastic waste to be manufactured into lawn chairs	Plastic Flamingo : Recycling/upcycling plastic wastes recovered from waterways into furniture (The PLAF, 2025)

Country	Indonesia	Philippines
	Waste4Change (2025): Operating in both countries, Waste4Change provides sustainable waste management practices and diversion of plastic waste from landfills Go Green Indonesia: Produces reusable bags from natural elements and provides education and community outreach to promote eco-conscious behavior (Go Green Indonesia Ku, 2009) Avani Eco (2025): Employs materials such as cassava, sugar cane and corn starch to manufacture containers and carrier bags Evoware (2022): Develops and manufactures eco-friendly containers, bags and utensils made from cassava and seaweeds as sustainable alternatives to conventional plastics	Go Green Philippines: Focuses on creating solutions for waste management, recycling and upcycling where recycling services are also offered to both communities and companies (Go Green PH, 2024) SACHI-Group Inc. (2025): Specializes in the manufacture of different kinds of single-use bags by using cassava starch; offering customizable solutions to meet client-specific needs ZealX International Ltd. (2024): Uses natural fibers to create reusable bags and promotes social disassociation from single-use plastics Ecolutions (2025): Produces single-use yet compostable containers and utensils by utilizing renewable resources like sugarcane bagasse and bamboo, offering a biodegradable solution to plastic-based food packaging

Note. Adapted from company websites.

Indonesia and the Philippines both demonstrate a strong entrepreneurial spirit with startups in both countries converting plastic waste into construction materials, furniture, reusable items, and offering app-based reward systems for recycling. Many of these efforts reflect shared strategies and mutual learning. However, these startups largely focus on mitigating the effects rather than preventing the root causes of plastic pollution (Beyond Plastics, 2025).

The fundamental issues—*how plastic is produced, the excessive quantity being manufactured, and the public’s dependence on single-use plastics*—are rarely addressed at their source. These systemic problems require coordinated action from governments and shareholders.. While NGOs and startups are making huge efforts, without firm and sustained government involvement, these initiatives risk being

insufficient or short-lived (Greenpeace, 2024; Beyond Plastics, 2025). Furthermore, governments must also recognize that public willingness to follow regulations often hinges on visible government leadership, transparency and consistent enforcement. These government-private-public partnerships are key to turning these opportunities into long-term success (Facal, Lafaye, and Nilsson, 2021).

Table 19 summarizes the key opportunities identified in both Indonesia and the Philippines that remain in their early phases of development but hold significant potential for long-term impact. These opportunities reflect areas where policies, technologies, or partnerships have already been initiated, yet require further investment, scale-up, or institutional support to achieve measurable outcomes.

Table 19

Opportunities

Indonesia	Philippines
Slow but sure grasp of current negative situations brought by plastic pollution and private sectors’ fight against plastic pollution. Alternatives using cassava and seaweeds have already produced results and the government’s support and funding for research and development. Research and development underway as one of Indonesia’s key points in handling plastic waste: a) marine debris monitoring system; b) development of biodegradable plastic bags Traditional markets or <i>pasars</i>, are pliable and ready to follow government regulations as long as accountability systems are in place.	Idea of a circular economy is slowly but surely catching up. Education should still be a priority to raise public awareness nationwide. Filipino entrepreneurs have started collecting plastic waste and recycling them into durable furniture and as ingredient in building/construction materials. Government apps still in the infancy stage, but can boost plastic pollution accountability and citizens are invited to join awareness campaigns and rewarded with incentives that is transferrable for payment of utilities Plastic bans and restrictions works if the government provides alternatives to its use. Sustainability is feasible when governing factors are consistent with implementing laws.

Note. Adapted from MoEF, 2021; DENR, 2023.

Indonesia and the Philippines both show similar approaches in supporting research on plastic pollution, though mainly through indirect means. While collaboration with organizations seeking alternatives to single-use plastics is growing, neither country has yet reached the point of consistently providing direct government funding for these innovations. The Indonesian government has ramped up partnerships with private companies (NPAP, 2022), while the Philippines has supported a few initiatives.

The Philippines' National Solid Waste Management Framework contains a clause stating that it is tasked with "promoting and supporting the development of technologies and programs that support waste management, including through partnerships with businesses and NGOs," and this "includes the provision of grants or subsidies to businesses implementing innovative waste management technologies or initiatives that align with the goals of the law" (NSWMC, 2004).

Similarly, Indonesia's Financing Task Force members aim to reduce plastic pollution by "building enabling conditions for financing solutions and making system change, through research, coordination, resources and direct action" (NPAP, 2020).

Despite these provisions, most successful startup companies have developed their innovations through self-funding or by securing support from international organizations (Subbonitskiy, 2024). Government support has largely been limited to research collaborations. Nonetheless, both Indonesia's Ministry of Environment and Forestry and the Philippines' Department of Environment and Natural Resources have partnered with academic institutions and independent researchers to provide evidence-based policy-making by studying the effects of plastics, microplastics, and plastic leakage—particularly their entry into the food chain via marine ecosystems. However, translating findings into strategies remains a persistent challenge.

Partnerships and Collaborations

Table 20 provides a comparative overview of key projects that have received government support in both countries. They also highlight the crucial role that government endorsement and investment play in translating innovative concepts into sustainable solutions. These projects demonstrate how public-sector involvement can legitimize and scale grassroots or private-sector initiatives, especially when aligned with national policy goals. It also illustrates how varying levels of government commitment—whether through funding, policy integration or technical support— directly influence the long-term viability and replication of plastic waste management innovations.

Table 20

Successful Partnerships

Indonesia	Philippines
Ministry of Environment and Forestry partners with World Bank and UN Environment to fund projects mitigating plastic pollution. (UNEP, 2025)	Department of Science and Technology (DOST) funds R&D for biodegradable plastic alternatives. (DOST, 2025)
National Research and Innovation Agency (BRIN) provides grants for sustainable plastic alternatives and advanced recycling tech. (BRIN, 2025)	Republic Cement’s Waste-to-Energy project received support from government and NGOs to convert plastic waste into fuel. (DENR, 2023)
National Plastic Waste Reduction Program collaborates with NGOs and universities to support research on biodegradable alternatives. (NPAP, 2020)	Mindanao Development Authority (MinDA) funds R&D on local recycling systems and biodegradable solutions. (MinDA, 2025)
Local governments offer small-scale grants for research on coastal plastic pollution and waste-reducing tech. (UNDP, 2024)	Global Environment Facility and UNDP support projects promoting circular economy and sustainable alternatives in Manila. (UNDP, 2024)
Ministry of Industry partners with academia for research on plastic alternatives and eco-friendly production. (KLHK, 2020)	De La Salle University and University of the Philippines received funding for plastic waste research via government and NGO collaboration. (UNDP, 2022)

Note. Adapted from organization websites.

Behavioral and Cultural Outcomes

Plastic bans have also served as a catalyst for behavioral change in citizens, prompting shifts in consumption habits and disposal practices. While often criticized for lacking long-term impact without proper enforcement or alternatives, these bans have nonetheless contributed to greater public awareness of plastic pollution. In Indonesia and the Philippines, changes in consumer behavior have been observed. These shifts are most notable in urban areas where policies are more strictly implemented and supported by awareness campaigns. Table 21 presents the prominent behavioral changes on plastic waste generation in both countries, based on Waste Characterization Surveys conducted before and after the issuance of bans.

Table 21

Laws translating into Behavioral Response and Cultural Change

Policy/Law	Government Action	Citizen Behavioral Response	Resulting Cultural Change
Indonesia – Waste Bank Policy (MoEF Decree No. 13/2012)	Established community-based waste banks promoting 3Rs	Citizens began segregating waste and exchanging recyclables for money	Waste segregation became normalized in many urban communities, especially in Java and Sumatra
Philippines – RA 9003 (2000)	Mandated LGUs to implement segregation, recycling centers, and local awareness	Partial compliance; active barangays led local cleanups, but uneven enforcement across the country	Awareness improved, but cultural reliance on convenience plastics persisted in urban poor communities
Indonesia – Bali Plastic Ban (Pergub No. 97/2018)	Strict single-use plastic ban with local enforcement and awareness campaigns	Sharp drop in plastic bag usage in markets and stores; shoppers bring reusable bags	Shift toward eco-friendly practices, seen as part of “Bali pride” in environmentalism
Philippines – Local Ordinances (QC, Pasig, Muntinlupa)	City-specific bans on plastic bags, straws, utensils	Some retailers fully complied, others resisted; consumers gradually adapted	Younger generations began to view tote bags and reusables as socially responsible and trendy

Policy/Law	Government Action	Citizen Behavioral Response	Resulting Cultural Change
Indonesia – Plastic Bag Tax (2016 pilot, 2018 expansion)	Retailers charged customers for plastic bags	Bag usage dropped significantly in pilot areas; consumers began bringing reusable bags	Reusable bag use seen as smart and economical in urban areas
Indonesia – Ministerial Regulation No. 75/2019 (EPR Policy)	Obligated producers to manage post-consumer waste; encouraged eco-packaging	Large brands began pilot take-back schemes; consumers exposed to labeling and recycling instructions	Slow but growing public awareness of corporate responsibility; eco-conscious consumerism beginning to emerge
Philippines – Republic Act 11898 (EPR Act of 2023)	Required producers to recover a percentage of their plastic output annually	Corporations introduced branded drop-off bins; citizens began participating in take-back programs	Early signs of civic pride in corporate partnership and plastic return behavior, e.g. malls and schools
Indonesia – Regional bans (e.g., Jakarta, Surabaya)	Enforced localized bans on plastic bags, Styrofoam, straws	Retailer adaptation; consumers gradually stopped expecting free plastic bags	Green practices normalized in large cities; reusable culture in urban populations
Philippines – House Bill 9147 (Single-Use Plastic Regulation Act)	Aimed to gradually phase out problematic plastic types through tiers	Although enforcement is pending, NGOs and schools started promoting alternatives	Cultural discourse shifting toward sustainable lifestyle, e.g. youth and academe
Indonesia – Governor Regulation No. 142/2019	Mandated environmentally friendly shopping bags in traditional and modern markets	Vendors and consumers resisted at first, then adapted through cloth bags and woven carriers	“Green market” culture emerging in cities like Jakarta and Denpasar; older citizens reconnecting with traditional packaging
Philippines – NSWMC Resolution 1363 (2020)	Mandated nationwide compliance to single-use plastic regulation	LGUs started awareness drives, signage in markets, compliance checks	Cultural tension persists between regulation and daily convenience; a generational gap visible in behavioral adoption
Indonesia – Excise Tax Regulation (Plastic Bag Tax)	Imposed a fee on plastic bags at checkout	Usage dropped by 55–70% in pilot areas; many started carrying bags	“Bringing your own bag” seen as smart and responsible in urban areas; a new social norm among middle-income consumers

Policy/Law	Government Action	Citizen Behavioral Response	Resulting Cultural Change
Philippines – Local LGU bans in cities like San Fernando, Pampanga	Complete ban on styrofoam and single-use plastics in city markets	Citizens shifted to banana leaves, paper, and eco-bags	Revived traditional eco-packaging practices; culturally reframed plastic-free practices as “return to roots”

Note. Adapted from: Ministry of Maritime Affairs and Investment, 2020; World Bank Group, 2021; Schachter and Karasik, 2022; Wang and Karasik, 2022; Romianingsih, 2023; UN Environmental Programme, 2023; Barcelo, et.al., 2024; Reuters, 2024; Jong, 2025.

A clear pattern in behavioral change shows it is most evident in larger cities and tourist-heavy areas, where enforcement is stronger and public awareness is higher. Smaller towns have made progress, albeit slower, often hindered by limited access to alternatives and lower awareness levels (Mihai et al., 2022). Bans have proven that behavior can shift, but their success depends heavily on supporting economic and social factors for the change to be sustainable and widespread.

Economic Factors

- 1) Affordable, accessible alternatives are essential to reduce resistance.
- 2) Adequate recycling infrastructure ensures proper plastic waste management.
- 3) Gradual implementation of bans allows time for adjustment.
- 4) Clear, transparent guidelines prevent confusion about banned plastics and acceptable alternatives (Kumar et al., 2021).

Social Factors

- 5) Community engagement and visible leadership foster collective responsibility.
- 6) Normalizing reduced plastic use motivates behavioral change.
- 7) Convenience-driven solutions guide new habits.
- 8) Social incentives and campaigns encourage adoption of sustainable practices (Willis et al., 2024).

Table 22 outlines key challenges faced by Indonesia and the Philippines. Overcoming these issues demands accountability, innovation, and collaboration across all sectors and requires strong political will, steady investment, and better integration of informal waste workers into formal systems.

Table 22

Challenges

Challenge	Details
Waste management infrastructure	Always comes at the forefront of the plastic pollution issue in both countries. Unless proper investment is made to build recycling facilities in key areas, waste management will remain substandard. (Greenpeace, 2024; Beyond Plastics, 2025)
Cultural/behavioral shift from mitigation to prevention	Need for cultural change from believing plastic pollution can be resolved by recycling alone. Key is in the government's relationship with plastic manufacturers. (Beyond Plastics, 2025; NPAP, 2022)
Adequate public awareness and education	Inadequate education and lack of public awareness at basic levels are evident in improper waste management, poor segregation, and weak implementation cascading. (MoEF, 2021; DENR, 2023)
Realignment of implementation strategies	The primary solution lies between governments and plastic manufacturers. The petrochemical industry resists scaling back production. Politics and economics are key factors and only good leadership can strategize a better outcome. (Subbonitskiy, 2024)
Cheaper alternatives	A small increase in the cost of alternatives, such as a \$0.03 rise for cassava bags, quickly becomes prohibitive and impractical for mass adoption. (Recycle, 2024; COA, 2023)
Online shopping	There is no regulation on plastic packaging from online shopping, leading to large amounts of plastic wrap waste discarded immediately after opening. (dela Peña, 2021)
Archipelagic geography	Being archipelagic nations, many areas lack adequate infrastructure to manage plastic pollution, resulting in large amounts of plastic waste entering waterways. (Meijer, et al., 2021)
Informal waste collection systems	Both countries rely on informal waste pickers who often lack knowledge of sustainable waste management. They only sort valuable materials, while the rest is scattered, causing further problems. (Hasan, 2021)
Support for technological advances	Both countries need to increase support for local industries working on alternatives to single-use plastics and innovative mitigation technologies. (Kitson, 2018; Barr, 2019)

Note. A host of challenges will always be present as this is a formidable task that both governments must face.

Table 23 highlights best practices implemented in Indonesia and the Philippines. These community-driven, educational, and infrastructure-based initiatives offer valuable insights into scalable and sustainable plastic waste management efforts, demonstrating how localized solutions, when supported by policy and public participation, can lead to measurable environmental improvements.

Table 23

Best Practices

Best Practices	Indonesia	Philippines
Community-Based Waste Segregation	Promotion of household-level waste segregation habits through local education campaigns and facilitators (Suryani et al, 2023).	Barangay-level waste segregation and education programs with community leaders’ participation and monitoring (DENR, 2022).
Public Awareness & Education	Community-based awareness campaigns on the impacts of plastic pollution and waste reduction, conducted through schools and mass media platforms (Wahyuni et al, 2021).	Mainstreaming of environmental education into school curricula, complemented by nationwide information campaigns led by educational institutions (DepEd, 2023).
Waste Collection Improvements	Expansion of door-to-door waste collection in urban and semi-urban areas to reduce illegal dumping (MoEF, 2024).	Enhancing localized waste collection systems, particularly in rural and coastal communities (NWRB Philippines, 2023).
Infrastructure Development	Increased investment in community-level material recovery facilities (MRFs) aimed at improving local waste sorting efficiency and overall recycling rates (Adhi, et al, 2022).	Establishment and systematic upgrading of MRFs have been actively supported by Local Government Units with emphasis on community participation and oversight mechanisms (CCC Philippines, 2023).
River and Coastal Clean-ups	Community clean-up events organized by local groups to reduce plastic waste in waterways (Kusuma & Prasetyo, 2023).	Collaborative coastal clean-up drives engaging schools, NGOs, and government agencies to protect local marine environments (DENR, 2022).
Public-Private Partnerships	Collaboration with waste management companies to improve collection logistics and recycling capacities (Hadi & Wulandari, 2022).	Partnerships between LGUs and private firms for efficient waste management services and technology sharing (ADB Philippines, 2023).

Best Practices	Indonesia	Philippines
Incentives for Recycling	Incentive-based recycling programs offering rewards or discounts for households participating actively in waste segregation and recycling efforts (Putri et al., 2024).	Community-led “waste-to-value” initiatives converting recyclable materials into cash or essential items aimed at encouraging citizen engagement in waste recovery (EcoWaste Coalition, 2024).
Capacity Building & Training	Specialized training programs for local officials and waste workers on sustainable waste management systems, operational efficiency and best practices (Sari et al., 2022).	Capacity-building workshops for community waste officers and volunteers on sustainable waste management techniques, resource recovery and environmental stewardship (DENR, 2022).

Note. This list has the potential to make a significant impact—provided that all stakeholders actively fulfill their respective roles and responsibilities.

Community participation, education, and well-supported infrastructure are essential to fostering long-term behavioral change and environmental responsibility. By learning from and scaling these approaches, both Indonesia and the Philippines can strengthen their efforts toward a more sustainable and circular plastic economy (MoEF, 2024).

While both countries share similar legislative foundations and challenges in plastic waste management, their approaches diverge in implementation and innovation. Indonesia has demonstrated stronger national planning and integration across government levels, while the Philippines has shown a more dynamic ecosystem of community-led initiatives and private-sector involvement. However, both continue to struggle with fragmented enforcement, underdeveloped infrastructure, and limited public engagement. The findings suggest that neither country holds a one-size-fits-all solution, but each offers valuable lessons the other can learn from. Advancing plastic waste management in both contexts will depend on how well they translate their frameworks into cohesive, inclusive, and scalable action.

The Singapore Strategy

Singapore's success in combating plastic pollution is frequently highlighted in comparison to other Southeast Asian countries. While its achievements are impressive, several unique factors give Singapore a distinct advantage in addressing environmental challenges. These factors include demographic, cultural, economic, and governmental strengths that create a conducive environment for effective plastic pollution management. Despite these advantages, Singapore's strategies can be adapted and applied in different contexts in Indonesia and the Philippines to improve their own efforts in reducing plastic waste and promoting sustainable practices across their larger and more diverse populations.

- 1) *Small population.* Governing and managing smaller population is generally more manageable compared to the complex challenges posed by denser populations (Singapore Environment Council, 2018).
- 2) *Cultural discipline.* Singaporeans have a strong culture of discipline rooted in the leadership legacy of former Prime Minister Lee Kwan Yew, which supports environmental responsibility (SG Green Plan, 2021).
- 3) *Strong government support.* The government actively promotes policies and generously supports external initiatives to improve Singapore's environmental conditions (Ministry of Sustainability and the Environment, 2021).
- 4) *Public awareness.* Significant investment in public awareness campaigns has led to a notable shift in citizen behavior, resulting in widespread practice of waste segregation and proper recycling habits (National Environment Agency, 2020).
- 5) *Technological innovation.* Better investment in technology helps combat plastic pollution and guard waterways. The government also takes proactive measures to enforce regulations and prevent pollution (GovTech Singapore, 2023).

- 6) *Economic resources*. Singapore's wealth allows large investment in infrastructure and education; Indonesia and the Philippines can similarly realign resources to prioritize these areas. (Ministry of Sustainability and the Environment, 2021).
- 7) *Promotion of a circular economy*. The government incentivizes companies to redesign production processes to reduce reliance on single-use plastics, which, though initially challenging, is an essential step in achieving sustainability and systemic change (National Environment Agency, 2020).
- 8) *Sustainable packaging*. Singapore facilitates dialogues with the food and beverage industry and offers incentives to explore and adopt sustainable packaging options, leveraging existing regulations (National Environment Agency, 2020).

Table 24

Research into Cross-Scale Circularity Framework

Research Question	Aligned Framework Points	Summary of Contribution
1. How do Indonesia and the Philippines differ and align in their governmental policies on plastic waste management?	Localization; Infrastructure; Implementation; Consistent Operation	These points address the challenges of fragmented enforcement, inconsistent policy application, and infrastructure gaps across jurisdictions (Wang & Karasik, 2022; SeaCircular, 2020).
2. How are community awareness and engagement programs structured and implemented in both countries?	Public Awareness; Behavior; Sustainability; Consistent Operation	Emphasizes the role of culturally grounded education campaigns and barangay-level participation in shaping sustained behavior (GIDKP, 2023; COA, 2023).
3. What innovative technologies are currently used to reduce plastic pollution?	Localization; Technology and Innovation; Sustainability	Reflects the rise of startups, mobile apps, and alternative packaging solutions that contribute to scalable, tech-enabled waste reduction (PlasticPay, 2024; Rebricks, 2023).

Research Question	Aligned Framework Points	Summary of Contribution
4. Which private sector partnerships support anti-plastic initiatives, and how effective are they?	Partnerships; Funding and Resources	Highlights multi-stakeholder approaches, including PPPs, donor-backed programs, and corporate social responsibility (CSR) efforts (DENR, 2023; MoEF, 2020).
5. How have policies shaped public behavior and cultural attitudes toward plastic use?	Public Awareness; Behavior; Localization	Demonstrates the importance of aligning policy with habit change, community buy-in, and context-specific adaptation (PARMS, 2025; UNEP, 2022).

Note. See 10-point Framework on Recommendations.

This table outlines how the 10-point framework—introduced in the following chapter and developed through this study—corresponds directly to the five core research questions that shaped the investigation. Each component of the framework is grounded in recurring thematic insights from Indonesia and the Philippines, reflecting both country-specific experiences and shared regional patterns. The framework was designed not only to enhance the effectiveness and coherence of national-level implementation strategies but also to offer a scalable, adaptable model for ASEAN-wide application. By aligning with Southeast Asia's broader sustainability goals, it promotes regional cooperation, policy harmonization, and mutual learning across borders (MoEF, 2020; DENR, 2023).

Chapter VI

RECOMMENDATIONS

Whether or not one country has more advantages than another, what truly determines success in addressing plastic pollution is how a nation uses what it already has—how it allocates resources, prioritizes its spending, and remains committed to effective implementation. Results are always possible when policies are backed by action, funding, and strong governance. Both Indonesia and the Philippines have developed national waste management standards aligned with global frameworks while adapting them to fit local cultural, social, and economic contexts. Localizing regulations based on community needs has proven to be a viable strategy that offers flexibility without compromising impact.

From the findings of this research, a twelve-pronged mind map was developed. This framework outlines key factors already known and, in many cases, already in practice by both governments. What is needed now is stronger coordination, clearer guidance, more consistent support between agencies, and more skillful execution at all levels. Although these strategies are not new, organizing them into a unified, practical structure offers a refreshed and actionable approach to advancing the fight against plastic pollution.

ENDING THE VISCIOUS CYCLE OF PLASTIC POLLUTION FRAMEWORK

Effective Government Intervention

As the primary catalyst and key stakeholder in addressing plastic pollution, the government's leadership is indispensable. Without strong, proactive governance, progress will remain minimal. Both Indonesia and the Philippines have already

established comprehensive waste management laws, policies, and roadmaps—demonstrating a clear intent for change. However, intent must be matched with urgent and decisive action.

The Waste Management Acts of both countries are sound frameworks, yet their effectiveness depends on timely and consistent implementation. With nearly two decades passed since Indonesia's enactment and over 25 years for the Philippines, overdue action must now become a priority. Both governments possess the resources to fulfill these commitments—what remains is the political will to place environmental sustainability at the forefront. After all, the choices made today will directly impact whether future generations face the consequences or benefit from the actions of this generation (UN Environment, 2017; SG Green Plan, 2021).

1. Proper Cascading and Localization

Government policies on plastic waste management have reached the grassroots level, but their effectiveness often varies due to the diverse cultural, economic, and geographic contexts across regions. What proves successful in one locality—such as a rural village—may not be effective in a densely populated urban area (Zhang and He, 2021). This disparity has sparked ongoing debate about the value of localization in implementing environmental policies.

Localized solutions allow communities to develop systems that align with their unique conditions—factoring in distance from urban centers, economic capacities, available infrastructure, and surrounding ecosystems. This approach enhances efficiency and strengthens accountability, as local leaders are better positioned to respond to their constituents' needs. However, the challenge lies in maintaining consistency. Customizing policies can create discrepancies in implementation that may conflict with broader national goals and standards (Brand Auditors, 2025).

For this reason, governments must strike a balance between flexibility and coherence which can enhance policy scalability by aligning national objectives with context-specific solutions, thereby fostering coordinated yet adaptive responses to diverse socio-economic conditions. While a centralized framework provides necessary structure and direction, excessive rigidity can hinder innovation and local responsiveness. Allowing adaptable systems within national guidelines ensures that environmental efforts remain both effective and inclusive. Table 6.1 outlines the key advantages and disadvantages of localized plastic waste management strategies.

Table 25

Pros and Cons of Localization

Advantages	Disadvantages
Tailored to Local Needs Approaches align more closely to cultural, economic, and practical realities better than broad national standards. Low-Cost Innovation Local inventors can create practical solutions at low cost using local materials. Community Ownership Greater involvement leads to increased transparency, accountability and responsibility for plastic management. Flexible and Adaptive Quick testing and adjustment of strategies suited to local needs. Stronger Local Enforcement Closer interaction with local businesses and households make monitoring and regulation easier. Adapted to Local Environments Systems can be customized to suit mountains, rivers, coasts, etc.	Inequality Between Communities Wealthier communities often manage waste more effectively; leaving poorer areas with inadequate solutions. High Costs in Some Areas Limited economies of scale and lack of access to tools or capital make local production more expensive. Strained Local Capacity Communities lacking sufficient infrastructure or resources may struggle to manage growing volumes of waste. Improper Waste Handling Lack of training may lead to mixed or mismanaged waste disposal. Poor Coordination Across Regions Without centralized oversight, inconsistent approaches may allow waste to spill over into neighboring areas. Diverse Ecosystems Bring Challenges No single method works in all terrain and climate types.

Note. Adapted from: Schmaltz, et al, 2020; Evode, et al, 2021; Wang & Karasik, 2022; Willis, et al, 2022; World Economic Forum, 2022; Kibria, et al, 2023; Brand Auditors, 2025.

2. Partnerships and Collaboration

The fight against plastic pollution requires strong partnerships beyond government efforts, especially with plastic manufacturers and major users of single-use plastics. Like Singapore, Indonesia and the Philippines need to engage these companies in setting production limits and addressing problematic plastics such as laminated packaging—common in household products—which contribute significantly to pollution due to improper disposal (National Environment Agency, 2020; Ramos, 2023).

Both countries have begun building multi-sector partnerships that must be strengthened and expanded:

- 1) Active community involvement is crucial for driving behavioral change and fostering collective responsibility and accountability. This shared commitment among citizens, government, and stakeholders is essential to ensure the long-term success of efforts against plastic pollution.
- 2) Local Government Units play a vital role as the primary implementers of plastic pollution policies at the community level. Their decisive leadership and accountability are essential for tailoring effective, localized solutions that address specific environmental challenges.
- 3) The Private Sector, especially plastic manufacturers, must take responsibility for the waste their products generate throughout their lifecycle. Extended Producer Responsibility laws require these companies to manage and reduce their plastic output actively.
- 4) Non-Government Organizations play a critical role in supporting government efforts by providing expertise, resources, and innovative solutions. They also

help raise awareness and mobilize communities to participate in plastic pollution reduction initiatives.

- 5) Research Institutions and all ongoing research is essential to developing new methods for reducing, recycling, and replacing plastics. Collaboration between institutions accelerates innovation and the creation of practical solutions tailored to local needs.
- 6) Environment Groups bring passion and advocacy that push governments and industries towards greater accountability. Their grassroots efforts help amplify the urgency of plastic pollution and engage wider public support.
- 7) Innovators create technologies and alternatives that make reducing plastic use feasible and affordable. Their inventions are crucial for transforming plastic pollution management at the community level.
- 8) Recyclers, including informal waste pickers, are on the frontlines of managing plastic waste but often lack proper tools and education. Supporting them with training and funding improves recycling efficiency and reduces environmental impact.
- 9) International Organizations bring valuable funding and advanced technologies to assist Indonesia and the Philippines in tackling plastic pollution. Coordination is necessary to align their support with local laws and cultural contexts.
- 10) The media serves as a powerful platform to educate the public and keep plastic pollution issues in the spotlight. Their outreach helps build awareness and fosters a sense of collective responsibility across communities. (NSWMC, 2020; SG Green Plan, 2021; NPAP, 2022).

A cohesive and results-driven multi-stakeholder collaboration is non-negotiable; fragmented efforts will only perpetuate systemic inefficiencies in plastic

waste governance. Robust coordination mechanisms and aligned accountability frameworks that are institutionalized helps to drive measurable and scalable outcomes (SG Green Plan, 2021).

3. Infrastructural Foundation

One of the most significant aspect in combatting plastic pollution is existing and updated recycling and solid waste management facilities. Being the very core of waste segregation and recycling practices, having necessary and adequate infrastructure is a non-negotiable. Many localities, especially in rural and suburban areas only have a recovery facility where waste is collected and stored, but no machines and suitable buildings to actually manufacture output such as processed plastic waste that can be sold to companies and organizations that can use them as base or raw materials to be used for the manufacture of other products (SG Green Plan, 2021).

What is not readily obvious is that although investing in solid waste management infrastructure requires huge investment and funding, it has mainly two economic benefits:

- 1) *Creation of green jobs, and*
- 2) *Cultivation of a circular economy;*

and two environmental benefits:

- 1) *Reduction of landfill contents, and*
- 2) *Prevention of waterway leakage, which eventually leads to a cleaner environment.* (National Environment Agency, 2020; PARMS, 2023).

While recycling is only a short-term solution to plastic pollution, adequate infrastructure plays a vital role in keeping plastic waste out of landfills and

waterways. However, for recycling systems to be effective, governments must prioritize plastic pollution consistently and allocate the necessary funding.

In both Indonesia and the Philippines, most recycling facilities are basic materials recovery facilities (MRFs) that mainly serve as waste sorting hubs (See Appendix D). While such facilities may work for small or rural communities, they are inadequate for major cities that generate enormous volumes of waste daily. As two of the most populous countries in the world—Indonesia ranking 4th and the Philippines 14th—their urban centers need industrial-scale recycling systems, not small MRFs (National Environment Agency, 2020; PARMS, 2023).

Currently, a large percentage of waste bypasses these facilities altogether, ending up in overflowing landfills. Informal waste pickers often sift through these dumps to salvage recyclables, leading to the rise of landfill communities built around this informal economy.

The lack of comprehensive infrastructure at scale reveals a missing foundation in the waste management chain. Without urgent and coordinated investments in recycling systems and downstream solutions, environmental degradation will continue to grow in both countries, making future recovery far more difficult and expensive (National Environment Agency, 2020; PARMS, 2023).

Another recycling facility is especially suited for the plastics listed on page 20 (see Appendix E). Processing these polymers can produce filaments for manufacturing new products, reducing the need for virgin materials. However, this facility relies heavily on community participation in proper segregation at the initial stage, which can be improved through awareness, education, and training. This facility supports the practice of a circular economy within the community (See Appendix F and Appendix G). By converting plastic waste into reusable materials, it

helps reduce environmental impact and promotes sustainable resource use (Kassab, et. al., 2023).

Indonesia and the Philippines do not need to rush into expensive, high-tech recycling facilities. A gradual, step-by-step approach is more practical, requiring less investment while still producing raw materials (filaments) for other products such as:

- 1) Eyewear and footwear;
- 2) Furniture, household items and toys;
- 3) Clothing, jewelry and accessories;
- 4) Industrial products such as manufacturing aids and tools;
- 5) Prototypes before mass production;
- 6) Functional end-use parts;
- 7) Automotive and aerospace parts; and
- 8) Medical, healthcare, dental products and implants

(Mikula, et al, 2021) (See Appendices G and H)

4. Public Awareness and Education

Consistent public education on plastic pollution raises awareness of its dangers and consequences. A hands-on approach can foster lasting habits if both governments actively promote it. Understanding the environmental and health impacts of plastic pollution should be a key goal to protect natural ecosystems and human well-being (SG Green Plan, 2021). Below are the benefits of educating the public:

A. Social and Behavioral Change

When people understand the harmful effects of plastic waste, they are more likely to adopt sustainable practices. Consistent government encouragement, visible actions, and available alternatives further motivate citizens to reduce

plastic use, reuse items, and choose biodegradable or reusable products. An informed public is more driven to change habits.

B. Civic Engagement

With a deeper understanding of key issues, communities are more likely to organize cleanup events, support environmental groups, and promote plastic reduction—creating a united effort against pollution. While prevention may not be their sole responsibility, communities can play a vital role in mitigating existing problems.

C. Increased Recycling Rates

Proper recycling and waste segregation can be taught through local education and awareness programs. These efforts help reduce plastic waste in landfills and ocean.

D. Advocacy and Policy Change

As the environment, behavior, and technology evolve rapidly, environmental policies must be regularly updated to remain effective and comprehensive. Public awareness drives demand for stronger government action, improved recycling facilities, and, importantly, accountability from plastic manufacturers for the end-of-life impact of their products.

E. Corporate Responsibility

Public awareness puts pressure on businesses—particularly plastic manufacturers and high-plastic-consuming industries—to adopt sustainable practices. In Southeast Asia, where word-of-mouth plays a strong role, businesses that neglect environmental responsibility risk losing public support. They can contribute by:

1. Reducing and reusing plastic packaging,

2. Using recyclable materials,
3. Offering sustainable alternatives,
4. Adopting circular economy models, and/or
5. Supporting environmental initiatives.

(Singapore Environment Council, 2018; National Environment Agency, 2020; Ministry of Sustainability and the Environment, 2021; NPAP, 2022; PARMS, 2023)

5. Technological Innovation

Technological innovation plays a crucial role in combating plastic pollution by offering effective short-term solutions—such as reducing, reusing, and recycling plastics—and long-term alternatives like replacing plastic components altogether. Key advancements in this area include:

Commonly known solutions:

A. Plastic Component Modification

One of the most impactful solutions to plastic pollution is the development of biodegradable plastics designed to disintegrate upon contact with hot or cold water, allowing users to control when disposal occurs (Schilling, 2019). The resulting micro-particles are proven to be harmless if ingested and pose no threat to the environment. (Kitson, 2018; NAS Daily, 2019). Furthermore, traditional plastic manufacturing machines can be adapted to produce biodegradable plastics by replacing petroleum-based ingredients with alternatives like limestone, starch, or polyvinyl alcohol (NAS Daily, 2019; Kitson, 2018; Schilling, 2019).

B. Biodegradable Plastics

Advances in material science have led to the development of biodegradable plastics made from renewable resources such as corn, cassava,

and algae. Unlike conventional petroleum-based plastics, which take centuries to break down, these alternatives decompose within months, significantly reducing long-term environmental harm. Cassava starch, for example, has been used to produce biodegradable plastic bags that decompose in about six months when buried—depending on soil quality—and leave no harmful residues (Lilavanichakul & Yoksan, 2023).

C. Plastic Recycling Technologies

Traditional recycling is becoming outdated. Recent innovations like chemical recycling and pyrolysis break plastics down into their original building blocks, allowing them to be reused as high-quality raw materials rather than being downcycled into lower-grade products (DOST, 2025).

D. Waterway Cleanup Technology

Projects like The Ocean Cleanup, led by Dutch entrepreneur Boyan Slat, use advanced technologies—such as large floating barriers and conveyor belts—to remove plastic waste from oceans (The Ocean Cleanup, 2025). In Indonesia, the Benchenghib siblings founded Sungai Watch, which focuses on clearing rivers of plastic pollution using similar methods (Sungai Watch, 2025). These initiatives aim to clean waterways and prevent plastic from reaching international waters.

E. Waste-to-Energy Technology

New technologies now allow plastic waste to be converted into energy through processes like pyrolysis and gasification. These methods use high heat to break down plastics into useful products such as oil or synthetic gas. While not eliminating plastic waste entirely, they significantly reduce its volume and offer an alternative energy source (DENR, 2023) (See Appendix A).

F. Plastic Waste-to-Construction Materials

Both Indonesia and the Philippines have adopted emerging technologies that transform plastic waste into construction materials such as bricks, tiles, and pavement. These products are durable—especially for road construction—cost-effective, and help reduce the volume of plastic waste destined for landfills (Green Antz Builders, 2014; Rebricks, 2025).

G. Alternative Packaging Solutions

Some companies were introduced in Pages 43 and 52, that are offering innovative alternatives for packaging in a bid to lessen plastic waste generation. Packaging made from mushrooms, seaweeds or other organic materials, and packaging that are edible have been invented. However, further study is needed as to its effect on the environment and consumer reception and attitude towards edibility of these kinds of packaging.

Hi-tech solutions

H. AI/Robotics Waste Sorting

Countries like the US and Finland have introduced advanced technologies and AI-powered robotic systems to improve waste sorting efficiency. Although costly, these robots can perform tasks typically done by informal pickers, reducing contamination risks and significantly boosting recycling rates (Fang et al, 2023).

I. 3D Printing with Recycled Plastic

3D printing is an effective way to transform recycled plastics into useful products. The resulting filament can be sold to manufacturers, reducing the need for new plastic production and supports circular economy principles by reintegrating waste into the production cycle (Kassab, et. al., 2023).

J. Plastic-Eating Microbes

A recent discovery involves microorganisms capable of breaking down plastics, especially polyethylene. While still under study, these "plastic-eating" microbes could offer a flexible solution for degrading plastics in landfills and oceans. Research is ongoing (Johnson, 2024).

6. Behavioral Enculturation

Behavioral enculturation *refers to the process by which individuals and groups learn and adopt the behaviors, customs, values, and norms of a particular society or culture*. In the context of combating plastic pollution, this concept expands beyond simply learning from other societies—it involves internalizing and practicing sustainable behaviors that benefit both individuals and communities, regardless of their origin (Mihai et al., 2022). Knowledge about plastic pollution, coupled with an understanding of practical solutions, plays a vital role in shaping how people perceive and respond to environmental challenges.

A. Influencing Collective Attitudes and Customs

Government influence is fundamental in shaping collective behavior. When government programs consistently promote sustainable practices—such as recycling, reducing plastic use, and choosing eco-friendly alternatives—these behaviors become normalized and embedded in daily life (National Environment Agency, 2022). Over time, values like environmental stewardship and minimalism can influence individuals to reassess their consumption habits. However, for behavioral enculturation to take root, consistency in messaging and implementation is essential, and integration of sustainability principles into formal education, public infrastructure, and market incentives helps ensure long-term adherence and systemic impact. .

B. Education and Public Awareness Campaigns

While it may seem repetitive, consistent public awareness campaigns are essential. Education about plastic pollution should begin in early childhood, much like how children learn social behaviors through enculturation. Embedding environmental education in schools can foster lifelong sustainable habits that are passed down through generations (Nishizawa, 2023). When schools, community programs, and media campaigns are mobilized as platforms for awareness, individuals are more likely to internalize sustainable values (Ministry of Sustainability and the Environment, 2021).

C. Policy and Community Support

As discussed in earlier chapters, government policy plays a critical role in promoting behavioral enculturation. When policies are strictly implemented and enforced across all levels of society, they can significantly influence behavior. Even short-term initiatives—such as plastic bag bans or incentives for reusable products—can shape societal norms. Community-wide practices like waste segregation, recycling, and local cleanup drives foster a culture of shared responsibility, encouraging sustainable habits that can be passed down through generations (Willis et al., 2024).

D. Behavioral Reinforcement and Feedback Loops

When individuals observe tangible outcomes or receive positive reinforcement, they are more likely to maintain sustainable behaviors. This creates feedback loops that strengthen cultural values around sustainability. As these behaviors are repeated and integrated into daily routines, they become ingrained in the cultural norm—gradually replacing harmful habits of the past (Mastrangelo & Cumming, 2024).

7. Resources and Funding Provision

Research funding is essential to empower local innovators in developing context-specific solutions to plastic pollution. While both Indonesia and the Philippines have initiated programs to support research and partnerships—particularly for alternatives to single-use plastics—neither country has yet established a comprehensive funding framework that supports innovation from concept to implementation. Below are key avenues both nations can explore to enhance support for local inventors and initiatives:

A. Government Grants

Governments worldwide often provide direct financial assistance to individuals and organizations working on public-interest innovations. For plastic pollution, local inventors often propose unique, practical solutions—from recycling technologies to alternative materials. Providing grants can empower grassroots innovators, enabling them to address local problems more effectively (Collins, 2025; National Environment Agency, 2020).

B. Research and Development (R&D) Support

Governments and NGOs can establish dedicated research and development support programs offering funding, access to technical expertise, advanced infrastructure, and long-term mentorship to help innovators test and refine technologies aimed at reducing plastic waste and improve circular economy outcomes (National Environment Agency, 2020; PARMS, 2023).

C. Public-Private Partnerships

Collaboration between government, private companies, NGOs, and academic institutions is vital. These partnerships offer funding, logistics, policy support, knowledge-sharing, and media exposure—fostering innovation and

extending the reach of local solutions. Local governments can also launch circular economy initiatives to attract external support and investment in sustainable waste management projects (Ministry of Sustainability and the Environment, 2021).

D. Policy Incentivization

Incentives such as subsidies, tax breaks, or regulatory support can motivate individuals and companies to develop plastic alternatives and invest in innovative recycling or waste-reduction technologies (MoEF, 2021; DENR, 2023). Clear and consistent policy backing sends a strong signal to the market, encouraging long-term investment in sustainability. Over time, these incentives can help establish a competitive green technology sector and accelerate the transition toward a low-waste, circular economy.

E. Local and National Competitions

Governments can organize innovation competitions to inspire new talent and generate solutions tailored to local challenges. These competitions can provide financial prizes, mentorship, investor access, and media coverage—helping to bring local innovations into the spotlight and onto the market (DENR, 2024).

F. International Collaboration and Funding

Indonesia and the Philippines both benefit from international funding and collaboration in addressing plastic pollution. However, these efforts often lack consistent visibility at the grassroots level. Without widespread public awareness or engagement, the potential impact of international initiatives is limited (Subbonitskiy, 2024). Increasing outreach and transparency can help maximize their effectiveness and integration into national strategies.

8. Sustainable Conservation

The environmental, economic, and social impacts of plastic waste are already being widely felt across Southeast Asia. Combatting this issue demands a multifaceted strategy that involves coordinated action across various sectors. This complex challenge requires a shift in public attitudes and consumption habits to reduce plastic dependency at its source and necessitates the integration of EPR mechanisms, circular economy models, and data-driven policy-making to ensure long-term effectiveness and systemic change. Achieving sustainability and environmental conservation hinges on several key factors:

A. Government Consistency

Government consistency is a cornerstone in the fight against plastic pollution. The influence and capacity of a government directly affect the effectiveness of environmental initiatives. When government policies are inconsistent or poorly implemented, it signals a lack of priority and weakens public motivation. Conversely, strong, continuous support from governing bodies creates a culture of accountability and inspires citizens to act (Ministry of Sustainability and the Environment, 2021).

B. Recycling and Circular Economy

1. Recycling Initiatives

Both Indonesia and the Philippines have basic recycling systems in place. However, these systems often operate with limited technological support. Improving collection, sorting, and reprocessing efficiency requires modernization, along with upskilling of the workforce to incorporate updated recycling technologies and best practices (MoEF, 2021; DENR, 2023).

2. Circular Economy

The concept of a circular economy—where resources are reused and recycled to extend their life cycle—is still not widely understood at the grassroots level. Promoting this model involves not just policies, but public education and infrastructure. When implemented properly, the circular economy minimizes waste buildup and lessens reliance on virgin plastic production (MoEF, 2021; DENR, 2023).

C. Reducing Plastic Use

Transitioning away from single-use plastics is a necessary but difficult step for many individuals due to convenience and affordability. Adopting reusable or biodegradable alternatives demands a shift in consumer behavior and habits (Stojic & Salhofer, 2022). Innovations have made eco-friendly materials like glass, metal, and plant-based bioplastics more accessible. With strong government promotion and incentives, the public can be guided toward sustainable choices.

D. Conservation of Ecosystems

Plastic pollution has devastating effects on marine and coastal ecosystems. Landfills, often located near bodies of water, contribute significantly to marine litter through leakage. Coral reefs and marine wildlife suffer from ingestion, entanglement, and habitat disruption caused by plastic debris. While conservation efforts are already in place in both countries, long-term solutions must address the upstream contributors, particularly waste management and plastic production. This includes improving infrastructure for waste collection and treatment, enforcing producer responsibility laws, and transitioning toward sustainable packaging materials. (See Chapter 2, p.11).

E. Innovative Technologies and Cleanup Efforts

Innovative technologies such as waste-to-energy conversion, chemical recycling, and AI-based sorting systems offer long-term potential for sustainable waste management. Meanwhile, cleanup campaigns—although a short-term solution—are effective in mitigating existing pollution. When regularly implemented and supported by both government and community, these efforts can significantly reduce recurring pollution and promote environmental consciousness (Singapore Environment Council, 2018).

F. Legislation

Effective environmental legislation provides the structural backbone for change. However, it must be locally adapted and consistently enforced. A one-size-fits-all approach rarely works across diverse cultural and socioeconomic settings. Hence, research and localized policy-making are essential. Policies such as plastic bans, Extended Producer Responsibility, and packaging reduction mandates are proven tools when matched with enforcement and public cooperation. Integrating behavioral insights and community engagement strategies into policy design enhances compliance, ensuring that legal frameworks translate into sustainable practices (Alegado, 2020).

G. Sustainable Production Practices

Transitioning to green manufacturing is crucial for long-term sustainability. Promoting and subsidizing eco-conscious industries supports a shift away from virgin plastic production. Companies can be encouraged to use recycled inputs and sustainable packaging. Innovations featured in previous sections highlight practical alternatives that, if supported by government policy and consumer demand, can redefine production norms.

9. Proper Implementation

Even the most robust laws and roadmaps require consistent and practical implementation. The long-term success of environmental initiatives aimed at reducing plastic pollution depends on the commitment of implementing bodies and their operational capacities to execute mandates with discipline, transparency, and persistence—regardless of political pressures, administrative challenges, or resource constraints.

A. Monitoring and Accountability

A strong implementation strategy hinges on continuous monitoring, reporting, and transparency. Establishing a system to track plastic waste generation, disposal, and recycling at both local and national levels allows for data-driven adjustments in policy. Regular assessments of environmental and health impacts ensure interventions remain responsive and effective (National Environment Agency, 2020).

B. Strengthening Extended Producer Responsibility (EPR)

A stricter EPR framework is essential to ensure companies—especially plastic producers—take full responsibility for their products throughout their life cycle. (MoEF, 2020; DENR, 2023). In countries like Indonesia and the Philippines, tackling the prevalent sachet economy can begin with exploring innovative alternatives:

1. Consumer Product Dispensers

For daily goods like shampoo, detergent, and condiments, dispensers could replace sachets. This reduces waste, cuts packaging costs, and supports sustainability. Feasibility studies are needed to address hygiene, refill logistics, and product preservation.

2. Refill Stations in Sari-Sari and Warung Stores

Dispensers in neighborhood stores could cater to low-income consumers while promoting reuse. Local-level studies could help assess acceptability and practicality which can guide the design of scalable, community-friendly refill systems..

3. Biodegradable Wraps for Soaps

Excessive plastic and cardboard packaging can be replaced with biodegradable wraps. Offering discounts for unpackaged items may also encourage waste reduction and reduce logging for box production.

4. Returnable Glass Bottles

Reintroducing glass bottles in place of PETs—supported by a deposit-return system—can significantly reduce plastic waste and promote a closed-loop system that facilitates material recovery, minimizes resource extraction, and revives proven, low-impact reuse practices from earlier decades.

C. Realigning Single-Use Plastic Bans

While single-use plastic bans showed early promise, post-pandemic habits and the growth of e-commerce have reversed some gains. Governments must now reassert and adapt bans with stronger enforcement and broader application (MoEF, 2021; DENR, 2023).

D. Industry Cooperation and Producer Accountability

Plastic manufacturers must be held accountable as central contributors to plastic waste. Governments should engage these industries in policy discussions and enforce their obligation to develop and operate recycling

facilities. EPR must go beyond token compliance—waste generated must be recycled or reused directly by producers (Congress of the Philippines, 2019).

10. Consistent Operation

Sustainability is mandated by the government.

Conservation is implemented by the government.

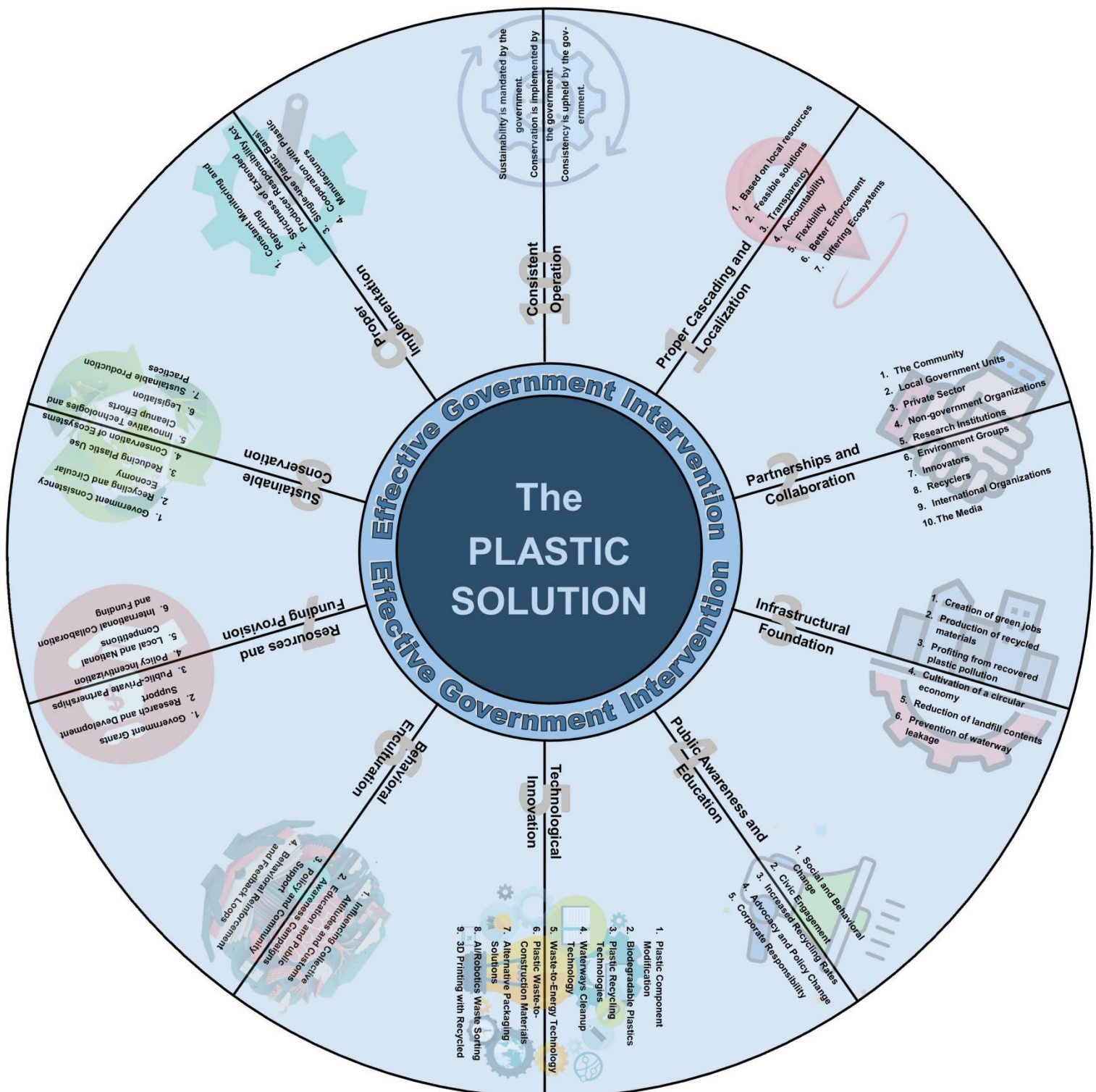
Consistency is upheld by the government.

Once a cycle of plastic waste management is in motion, consistency becomes the critical force that sustains progress. It is the government's responsibility to ensure that the momentum does not falter. Policies, programs, and innovations—no matter how well-crafted—are only as effective as the will to consistently implement them.

Consistency must transcend leadership. Administrations will change, political priorities will shift, and governing bodies will come and go. Yet, the environmental crisis remains—and so does our country (SeaCircular, 2020). The health of our land, waters, and communities must not hinge on political cycles. Instead, environmental stewardship must become a non-negotiable commitment, embedded across institutions, mandates, and transitions of power.

It is essential that every administration recognizes its duty not merely to govern, but to protect. To leave the country in better shape for the next generation is the highest form of public service. Consistency ensures that gains are not lost, that systems improve over time, and that the efforts of one administration are carried forward—not undone—by the next (Ministry of Sustainability and the Environment, 2021).

Figure 7. 10-Point Framework



Chapter VII

CONCLUSION

The 10-point framework presented in the previous chapter is a localized, actionable roadmap for combatting plastic pollution—one that is well within reach for both Indonesia and the Philippines. Though the blueprint is not unfamiliar to either government or its citizens, what makes the difference is implementation, consistency, and collective will.

This research underscores that the fight against plastic pollution is not merely a technical or environmental issue—it is a governance challenge, a community endeavor, a technological opportunity, a collaborative imperative, and most importantly, a behavioral transformation.

Below are the most crucial insights derived from this study, categorized and arranged in order of strategic importance and aligned with the five guiding pillars of sustainable action mentioned in Chapter 3:

1) Policies and Regulations

A. The strength of policy lies in consistency. Without consistent and enforceable regulation, even the best laws or roadmaps will fall short. Governments must ensure that anti-plastic efforts transcend political terms, creating continuity across leadership transitions (Ministry of Sustainability and the Environment, 2021).

B. Extended Producer Responsibility (EPR) laws must be fully enforced. These should not merely suggest, but obligate manufacturers to be accountable throughout a product's lifecycle (Congress of the Philippines, 2019; IBCSD, 2023).

C. The sachet economy requires bold policy redirection. Both nations must rethink how goods reach consumers without relying on single-use plastics. Feasible, scalable alternatives (such as dispensers or reusable packaging systems) must be studied and legislated into action (Bangkok Post, 2019) (Mun, 2023; Ramos, 2023).

2) Community Management and Capacity Development

A. Community-level behavior can shift—but only with institutional backing. Good habits can be instilled through consistent, on-the-ground initiatives, but bad habits return just as quickly without reinforcement (National Environment Agency, 2020).

B. Local government units must lead regular cleanup and awareness drives. One-off events are not enough. A monthly or bi-weekly program in highly affected areas can sustain both visibility and civic participation (MoEF, 2021; DENR, 2023).

C. Grassroots actors must be empowered. With capacity-building, incentives, and access to tools, individuals and small communities can become key players in local waste solutions (Greenpeace, 2024; Beyond Plastics, 2025).

3) Innovations and Technology

A. Recycling technologies must evolve. Governments should invest in advanced recycling which not only addresses waste but also creates green jobs and economic opportunities (Kassab, et. al., 2023).

B. Startup ecosystems need greater support. Many eco-startups offer viable alternatives to plastics but are hindered by higher costs and limited public reach. Government subsidies and support systems can bridge the gap (Beyond Plastics, 2025).

C. Short-term solutions like recycling and cleanup must not be mistaken for the end goal. They address symptoms, not causes. Innovation should target plastic reduction at its source (Beyond Plastics, 2025).

4) Partnerships and Collaborations

A. Government–industry dialogue is essential. Plastic manufacturers must be brought into transparent conversations. Accountability and compromise are critical to managing production, collection, and reprocessing of plastic waste (National Environment Agency, 2020).

B. Public–private partnerships (PPPs) can extend reach and impact. Collaborations with NGOs, academic institutions, and global agencies can bring in knowledge, funding, and support—especially when aligned with local needs (COA, 2023).

C. International collaborations must be better integrated locally. While global projects exist, their grassroots visibility remains low. Efforts should be made to enhance their influence and accessibility on the ground (National Environment Agency, 2020).

5) Behavioral and Cultural Outcomes

A. Behavior change is achievable with consistent messaging and incentives. One-time awareness events fade quickly; sustained campaigns build habits that last (Singapore Environment Council, 2018; National Environment Agency, 2020; Ministry of Sustainability and the Environment, 2021).

B. Plastic use is driven by culture, convenience, and access. Policy must acknowledge and work with these realities. Real change happens when eco-friendly behaviors become easy, affordable, and normalized (Ministry of Sustainability and the Environment, 2021).

C. Packaging choices should reflect both cultural values and environmental awareness. From supermarket practices to traditional sari-sari stores, transitioning away from unnecessary packaging requires localized solutions rooted in behavioral insight (Singapore Environment Council, 2018; Greenpeace, 2024; Beyond Plastics, 2025).

At the heart of all these insights lies one powerful truth: consistency is the lifeline of progress. No matter how brilliant a policy or how innovative a solution, without a steadfast, coordinated effort to implement and maintain them, success remains out of reach.

Governments come and go. Programs shift. Leaders change. But the country, and its ecological future, endures. Our environmental efforts must be built to last—beyond terms of office, beyond political cycles, and into the hands of generations that follow.

This fight against plastic pollution is not just a battle of systems and institutions. It is a legacy we leave behind. It is a duty we owe—to our people, to our environment, and to the future.

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FRAMEWORK IMAGES

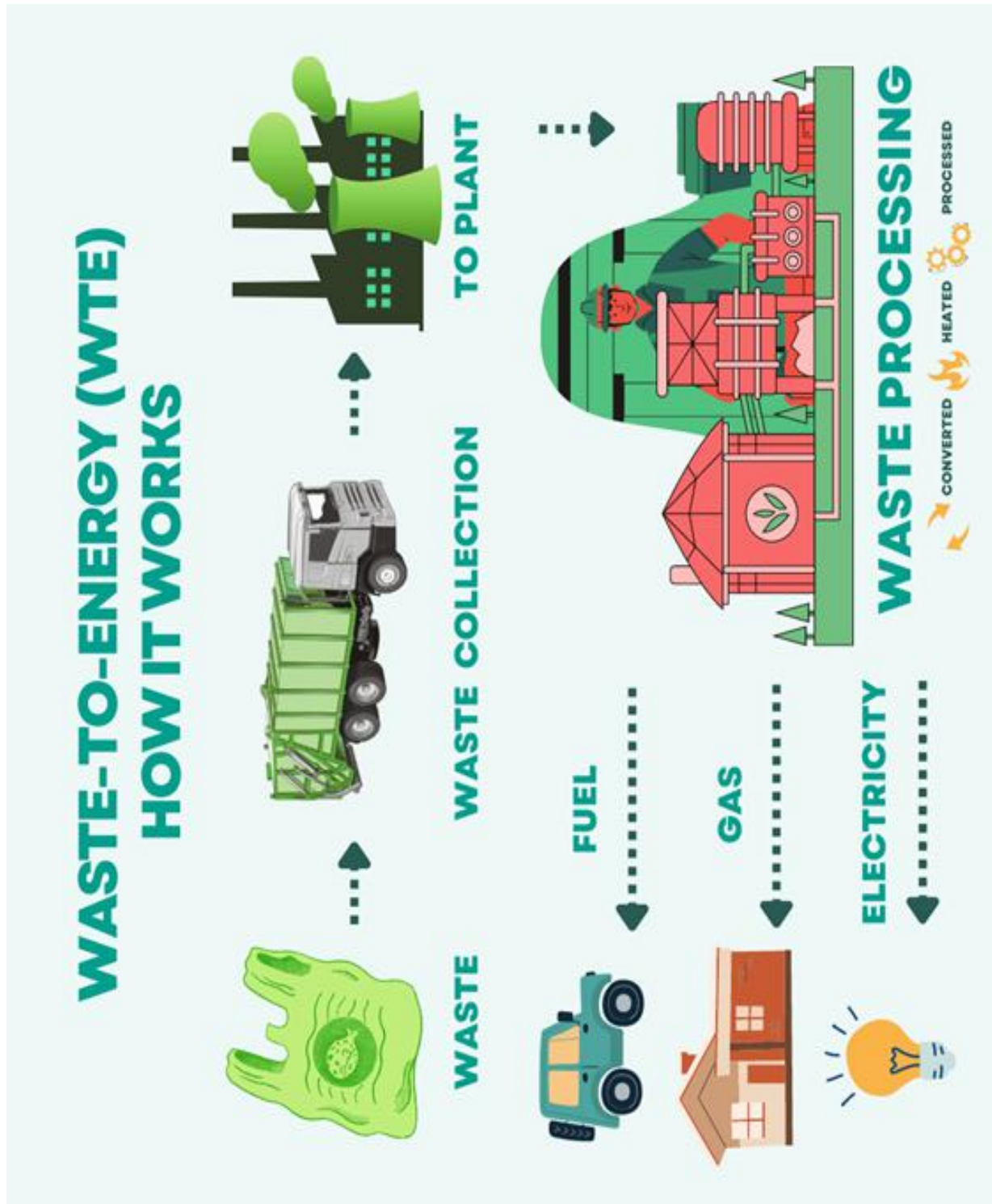
1. Proper Cascading and Localization
Pngtree. Flat Red Location Sign, Location Icon, Location Sign, Pin PNG and Vector with Transparent Background for Free Download. <https://www.pinterest.com/pin/red-map-marker--487655465913151441/>.
2. Partnerships and Collaboration
Hungrykart Partner App. https://play.google.com/store/apps/details?id=in.hungrykart.partnerapp&hl=en_IN&pli=1.
3. Infrastructural Foundation
Parzival 1997. Infraestructura icono gratis. https://www.flaticon.es/icono-gratis/infraestructura_9147877.
4. Public Awareness and Education
Flaticon. Awareness free icon. https://www.flaticon.com/free-icon/awareness_10752663.

5. Technological Innovation
Linguistic Data Consortium. <https://www ldc.upenn.edu/slide/ldcs-student-data-scholarship-program>.
6. Behavioral Enculturation
Adobe Stock. Enculturation. <https://stock.adobe.com/search?k=enculturation>.
7. Resources and Funding Provision
CleanPNG. Financial Logo with Red Background and Money Bag Symbol. <https://www.cleanpng.com/png-computer-icons-funding-charitable-organization-cli-2581196/>.
8. Sustainable Conservation
png.monster. Environmental Protection. <https://png.monster/environmental-protection/>.
9. Proper Implementation
Spoonshine. Spoonshine Cutlery Polisher Platinum Service. <https://www.spoonshine.co.uk/products/spoonshine-cutlery-polisher-platinum-service>.
10. Consistent Operation
FlatIcon. Consistency free icon. https://www.flaticon.com/free-icon/consistency_8365256.

APPENDICES

Appendix A

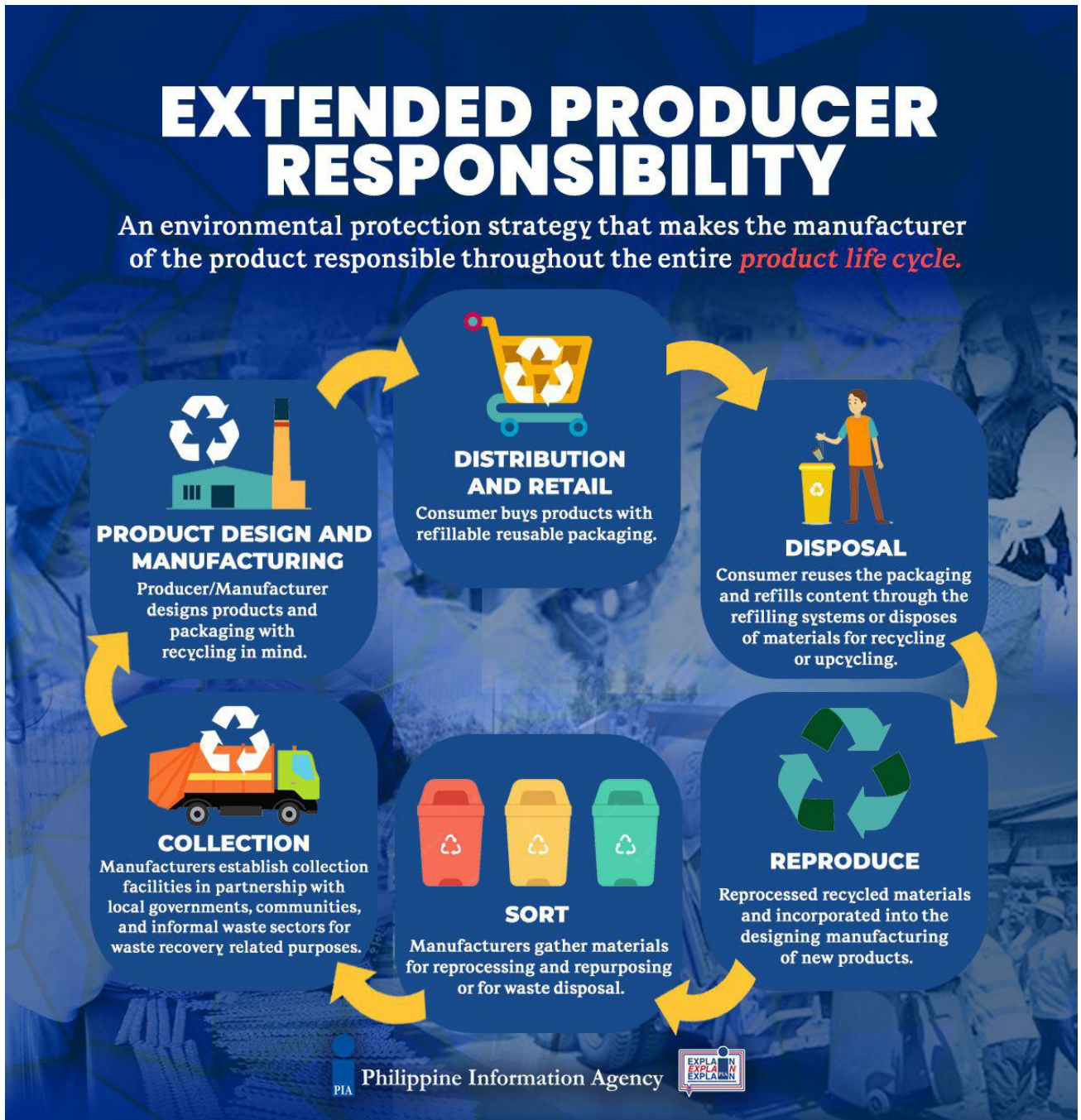
Waste-to-Energy System



Note. Very few companies in Indonesia and the Philippines utilize waste-to-energy method as a means to extricate plastic pollution from the environment (Energy Watch, 2023).

Appendix B

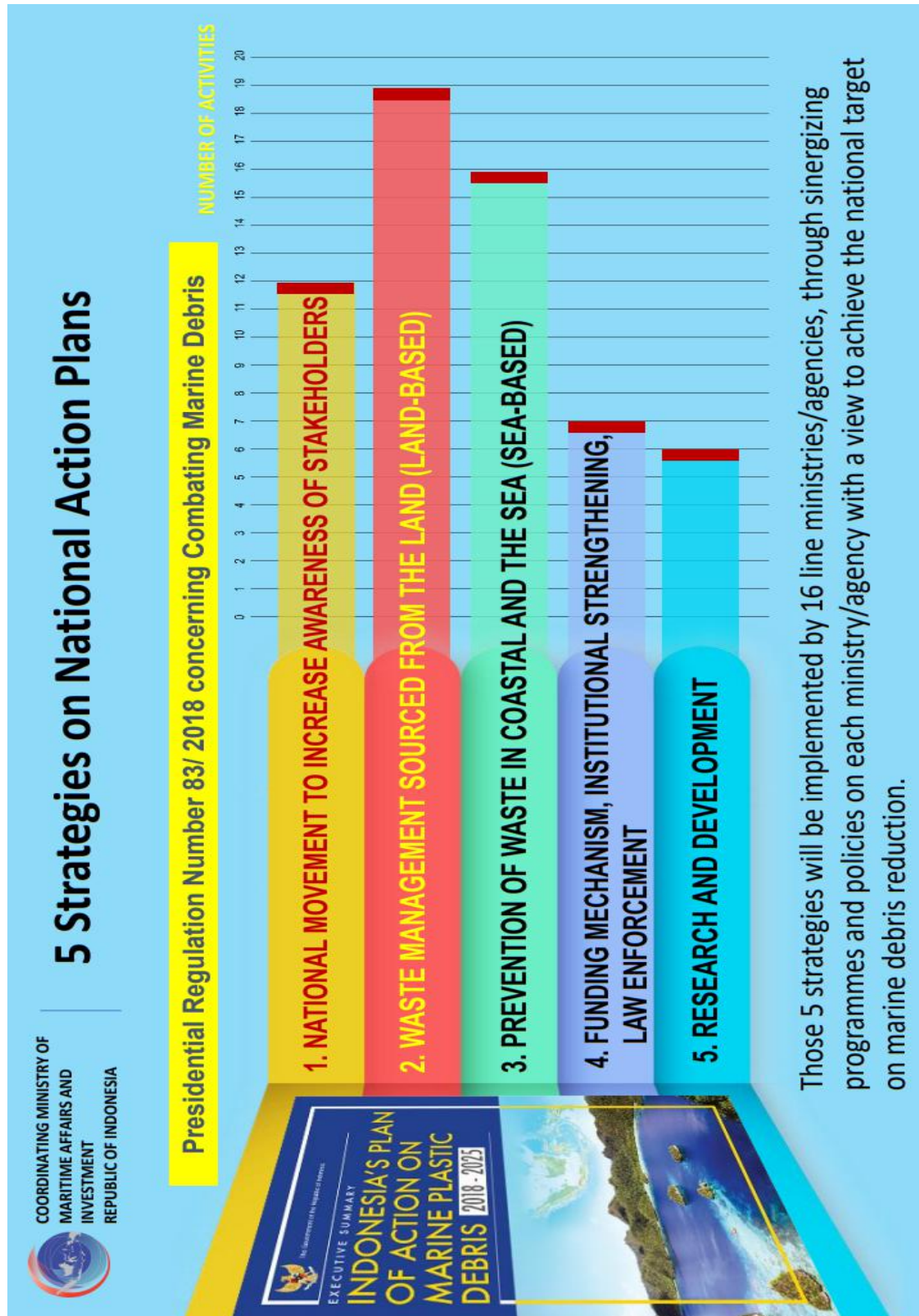
Diagram of the Extended Producer Responsibility Act



Note. Both Indonesia and the Philippines have implanted EPRs and delegate responsibility to manufacturers (Philippine Information Agency, 2023)

Appendix C

Indonesia's Strategies on Waste Management



Note. Indonesia's Plan of Action on Marine Plastic Debris entailed 5 strategies that will include related agencies to help in the program (Alhanif, 2021).

Appendix D

How a materials recovery facility works

UNLOADING AND SORTING

Mixed recycling is unloaded onto the tipping floor at the MRF. A front loader moves it onto a conveyor belt.

CARDBOARD AND PAPER

1 Rotating discs propel cardboard over the top while other materials fall through for further separation.

2 Two-dimensional objects (paper) are separated. Heavier, three-dimensional containers fall to the next step.

GLASS

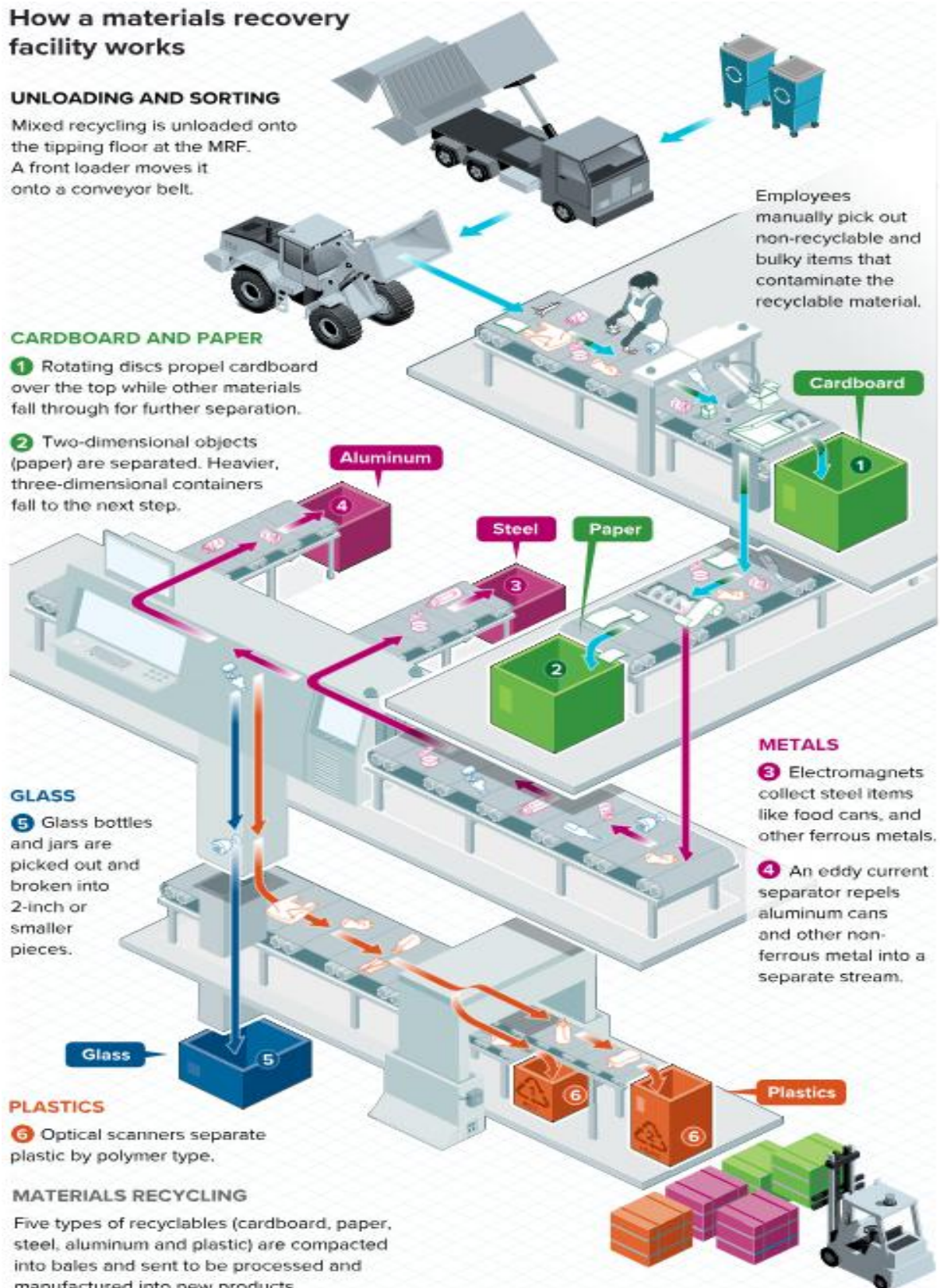
5 Glass bottles and jars are picked out and broken into 2-inch or smaller pieces.

PLASTICS

6 Optical scanners separate plastic by polymer type.

MATERIALS RECYCLING

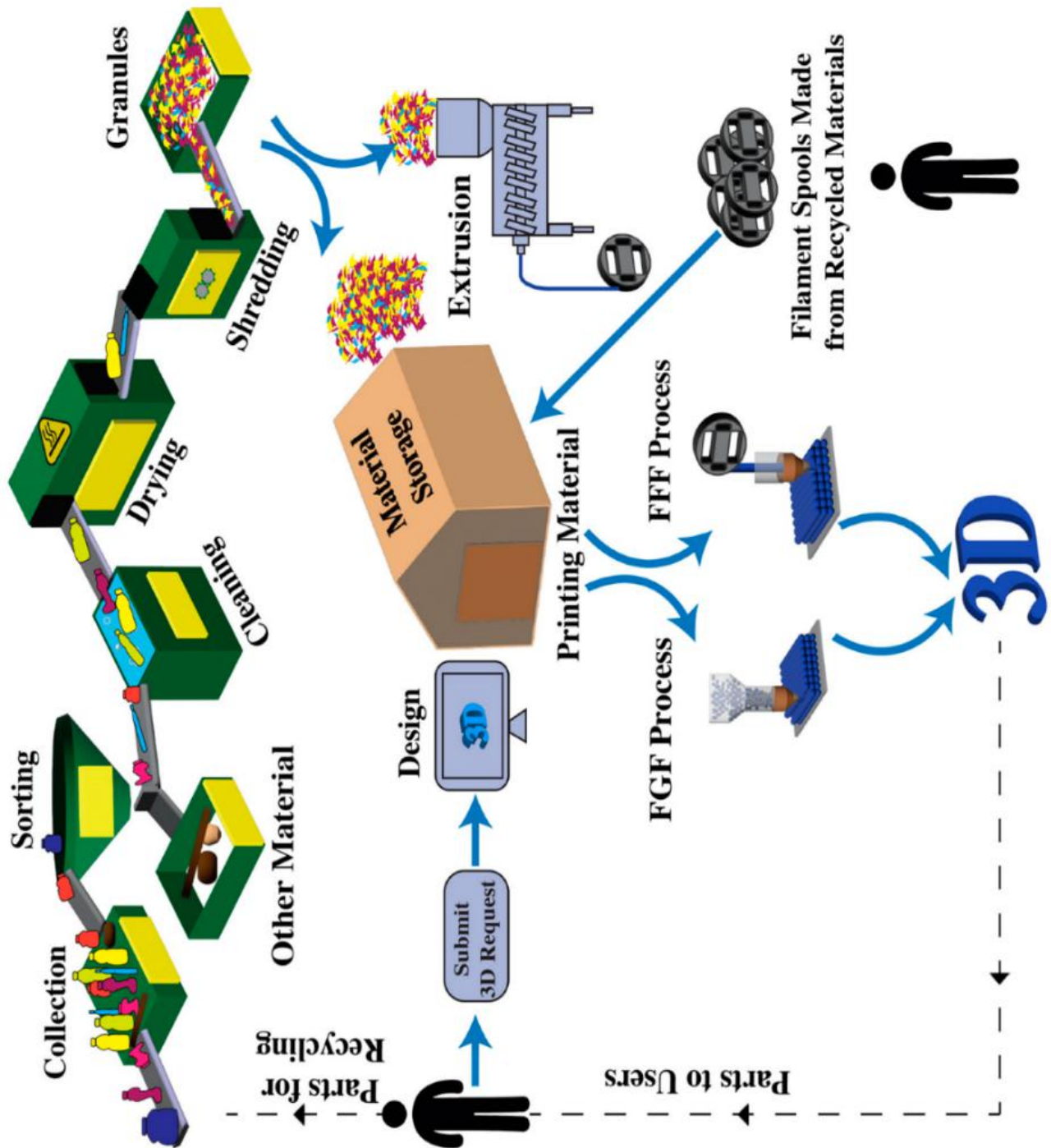
Five types of recyclables (cardboard, paper, steel, aluminum and plastic) are compacted into bales and sent to be processed and manufactured into new products.



Note. Adapted from: Knowable Magazine, 2020.

Appendix E

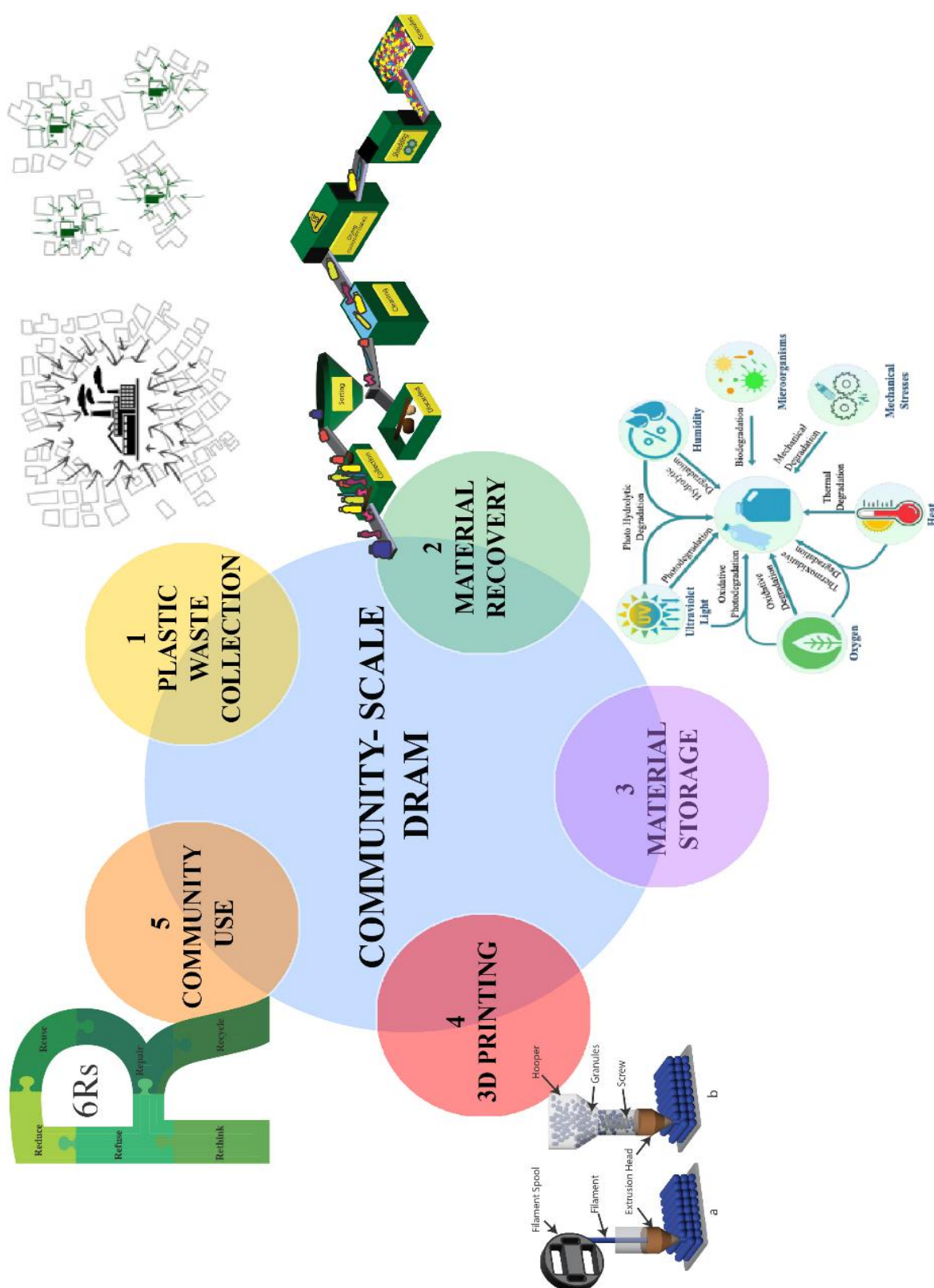
Plastic recycling transformed into raw materials



Note. Adapted from: Kassab, et. al., 2023.

Appendix F

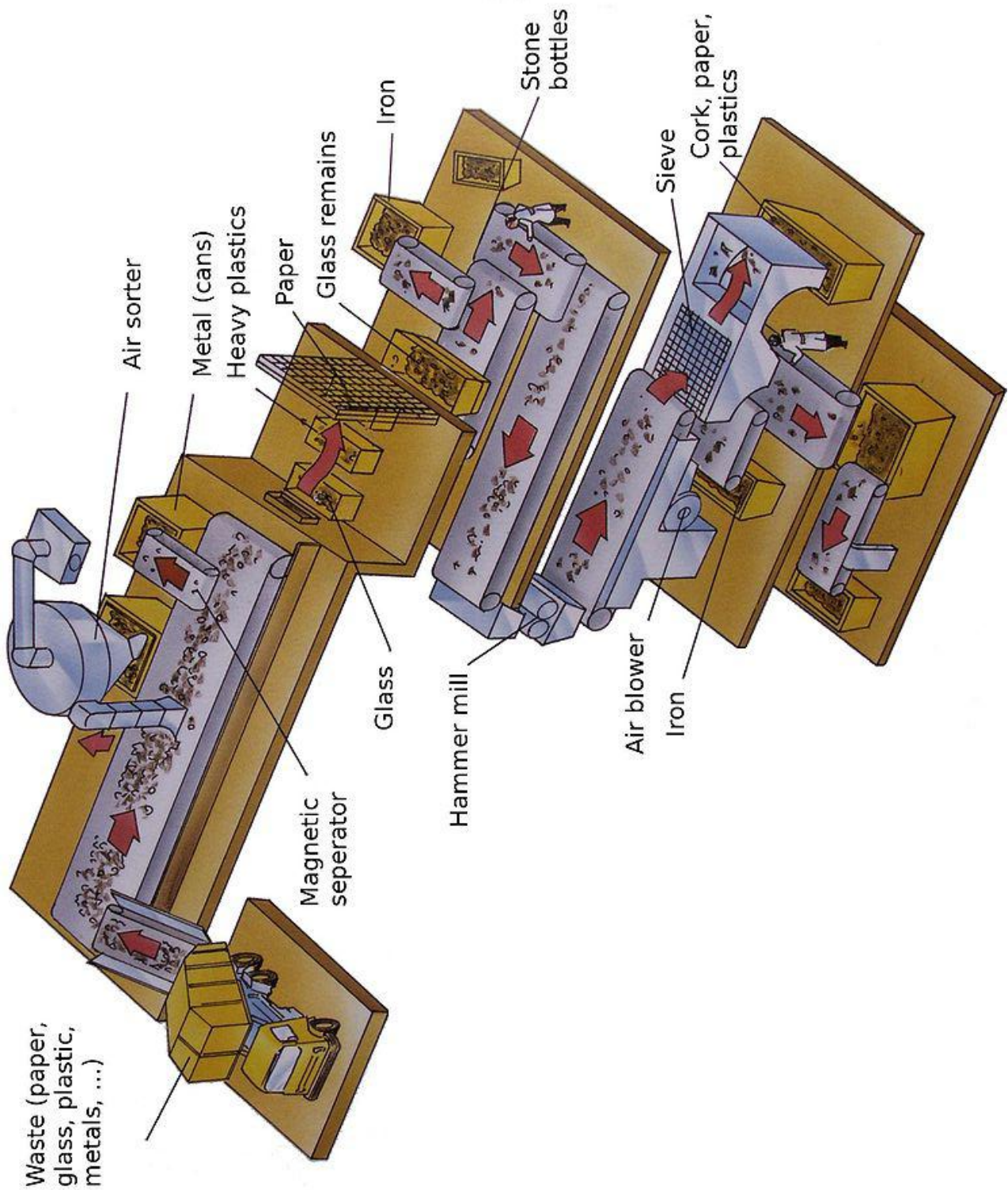
Ideal plastic cycle for a circular economy



Note. Adapted from: Kassab, et. al., 2023.

Appendix G

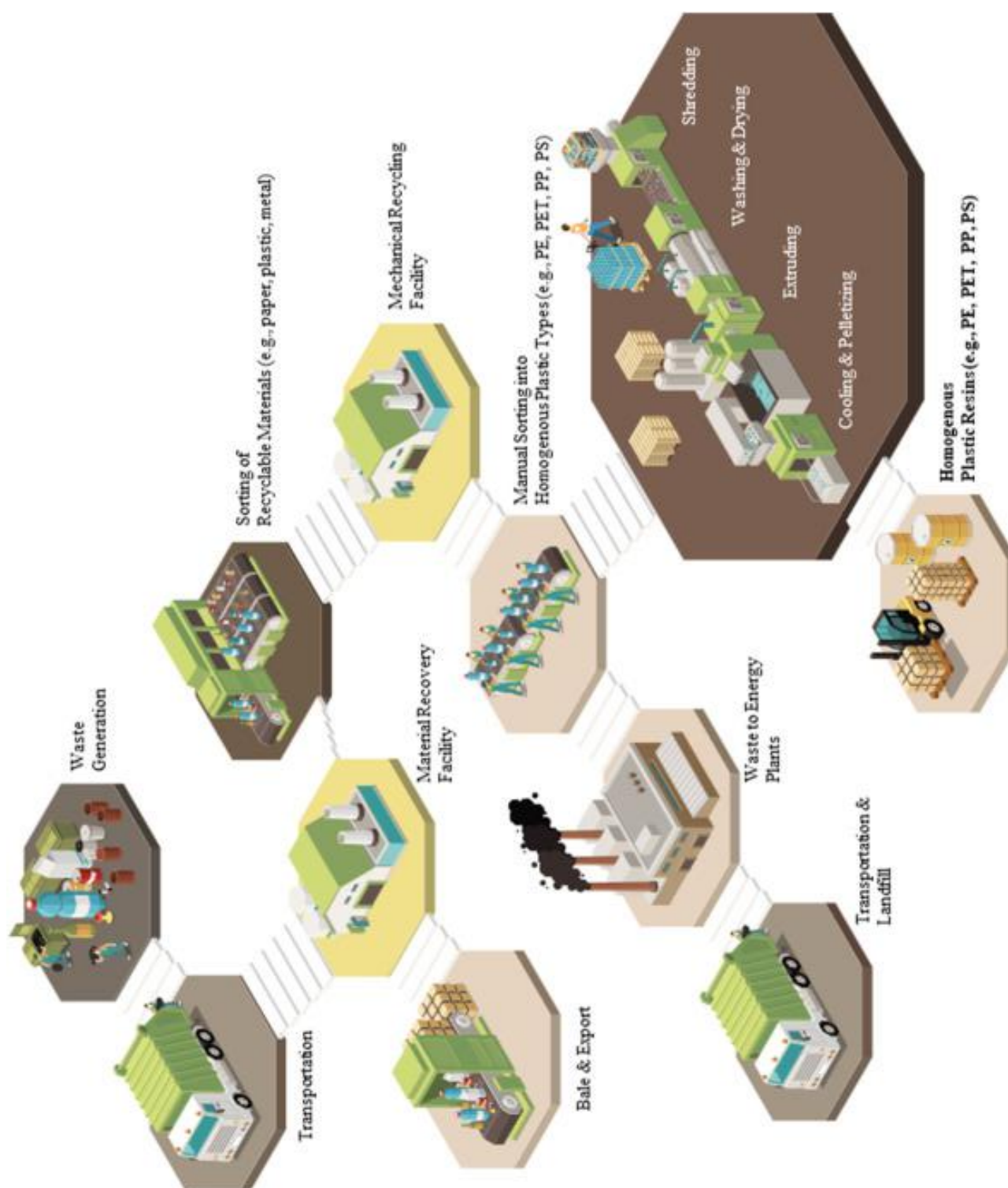
Comprehensive waste recovery facility (All types of waste)



Note. Adapted from: Guion, 2024.

Appendix H

Comprehensive plastic waste recovery and recycling facility



Note. Adapted from: Lee and Wong, 2023.