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Circularity for Plastic Waste in Developing Countries: Creating Protective Spaces for Reverse Logistics in the Philippines

Master's Thesis

Technology Governance and Digital Transformation

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I hereby declare that I have compiled the thesis independently

and all works, important standpoints and data by other authors

have been properly referenced and the same paper

has not been previously presented for grading.

The document length is 12454 words from the introduction to the end of the conclusion.

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TABLE OF CONTENTS

ABSTRACT

Plastic pollution remains a significant environmental challenge, especially in developing countries where inadequate infrastructure, weak policy implementation, and limited awareness and motivation hinder effective plastic waste management. Among these countries, the Philippines, along with neighboring Southeast Asian nations like Indonesia, Thailand, and Vietnam, significantly contribute to ocean plastic pollution. Despite having environmental laws and active citizen participation in clean-up initiatives, the Philippines continues to struggle as one of the world's top plastic polluters.

This study focuses on reverse logistics (RL) as a social innovation to address plastic waste management in developing countries, with a specific case study of the Philippines. RL involves collecting and recovering waste from the source to restore value streams, offering a sustainable approach to production and consumption. The research investigates the benefits and challenges of implementing RL, examines the success factors for reverse logistics organizations (RLOs), and explores the role of stakeholders in creating an enabling environment for RL adoption. Drawing on theoretical frameworks of social innovation, Strategic Niche Management (SNM) and Transformative Social Innovation Theory (TRANSIT), the study examines the emergence, development, and empowerment of RLOs in the Philippines. Through qualitative methods such as desk research and semi-structured interviews with representatives from RLOs, government institutions, communities, and companies, the research analyzes the relationships between RLOs and different actors in the network. The findings aim to shed light on the potential of RL as a transformative solution for plastic waste management in developing countries while providing insights into fostering stakeholder collaboration and creating supportive socio-institutional environments for RLOs. Ultimately, this study highlights the need to address the socio-institutional barriers that impede the emergence, development, and thriving of RLOs in developing countries, such as the Philippines, to effectively tackle the pressing issue of plastic waste pollution.

Keywords: reverse logistics, circular economy, protective space, narratives of change, plastic waste, plastic waste management, co-creation, transformative social innovation

1. INTRODUCTION

Plastic pollution has become a major environmental challenge, particularly in developing countries like the Philippines. The country and its neighbors in Southeast Asia, like Indonesia, Thailand, and Vietnam, are among the largest contributors to plastic pollution. Collectively, they contribute between 1.19 - 3.18 million metric tons (MMT) to ocean plastic (Jambeck et al., 2015). This mismanagement is due to inadequate facilities, weak policy implementation, and a lack of awareness and motivation in their respective communities (Gutberlet, 2018). However, these challenges present opportunities for innovative solutions to address this global scourge.

Over the past years, we have seen technologies and policies attempting to manage plastic waste. But these interventions alone cannot fully solve the global plastic waste problem or its underlying root causes (Boyle, 2022), calling for social innovation like reverse logistics (RL) to be considered as a part of the solution mix (Osburg & Schmidpeter, 2013). Reverse logistics involves collecting, transporting, and disposing of waste from the source back to value streams (Rogers & Tibben-Lembke, 1999). It has been identified as a way to drive sustainable production and consumption by recovering waste at the source, like from the communities and manufacturers (ibid).

This study investigates the benefits and challenges of implementing RL in developing countries and how collaboration between and among different stakeholders (like governments, companies, and communities) can create an enabling environment for the growth of Reverse Logistics Organizations (RLOs) so they can emerge, develop, and thrive. RLOs may include non-governmental organizations (NGOs), community-based organizations (CBOs), and social enterprises (SEs). Evers & Laville (2004) described these social actors as the Third Sector and they are organizations and entities at the intersection of public service and for-profit activities that operate outside of the traditional government and the business functions. These organizations play a crucial role in developing practical solutions to address social and environmental issues.

This thesis aims to analyze how to catalyze the transition from the current waste management system (e.g., landfilling, burning, indiscriminate disposal) into RL in developing countries. In the

Philippines, for example, despite the two-decade-old Ecological Solid Waste Management Act of 2000 that mandates collection and segregation at source and prioritization of recycling, core elements of RL, the country still struggles to intercept waste from leaking into the environment (Meijer et al., 2021; Jambeck et al., 2015) or ending up into landfills. Domingo & Manejar (2021) noted that while the law and its implementing local government units, together with other stakeholders, have performed well in disseminating information, the enforcement of the provisions fell short in supporting and creating an enabling environment.

This thesis hypothesizes that pushing RL as an alternative solution and supporting RLOs will provide a pathway to a more sustainable way of production and consumption. Therefore, this study aims to investigate the following research questions

1. What influences the success of RLOs in managing plastic waste in developing countries?
2. How can stakeholders help in the co-creation of enabling environment for RLOs to develop into practical alternatives for plastic waste management in developing countries?
3. What kind of socio-institutional environment supports the adoption of RL for plastic waste in the developing country context, including the role of key change agents/actors?

To understand the transition process, this study will position the RL as a transformative social innovation that is a sustainable alternative for plastic waste management. This study will be divided into two parts.

First, the theoretical discussion will give an overview of frameworks about the niche innovation presented by RLOs to drive the circular transition of plastic and the multi-actor nature of managing plastic waste. It is then followed by a review of the literature on RL and RLOs and their impact on developing countries in Southeast Asia, particularly Indonesia, Thailand, and Vietnam.

The theoretical framework will be developed for the analysis under the realm of social innovation focusing on co-creating an enabling environment for RLOs referred herein as Protective Space (Smith & Raven, 2012). This study will be based on Strategic Niche Management (SNM) wherein it will look at how different stakeholders or regime actors

(government, communities, and companies) are *shielding* the RLOs from the pressures of incumbent solutions and natural selection criteria, help in *nurturing* RL and RLOs' capabilities, and *empowering* the RLOs to be able to compete with the incumbents and alter the mainstream selection criteria (Schot & Geels, 2008; Witkamp et al., 2011). It will then be juxtaposed with Narratives of Change to find common narratives, beliefs, and stories to help drive RL forward. To help us understand the terminologies and the dynamics of the niche and its ecosystem, we will adopt the concepts of niche, regime, and landscape in Multi-Level Perspective (MLP) that describes the multi-scalar development of the innovation (Markard & Truffer, 2008).

Second, the empirical research will hone in on the Philippines' case and identify the factors influencing niche innovations' emergence, development, and empowerment. This will open the discussion into the relationship of RLOs with network actors and how they can create an enabling environment for innovation to thrive and become the dominant solution more aligned with sustainable development.

This case study will investigate social innovation in RL using a qualitative method through desk research and semi-structured interviews. It will be treated as a case study research which is appropriate for the early exploratory study stage (Rowley, 2002) and would help understand new concepts and issues (Yin, 2009) such as the Circular Economy and RL in its real-life context. The interviewees will come from four different groups or regime actors based on the framework by Avelino and Wittmayer (2018), the Multi-Actor Perspective (MAP) (a part of Transformative Social Innovation Theory (TRANSIT)), which are the Third Sector, government institutions, communities, and companies.

2. THEORETICAL DISCUSSION FOR CIRCULARITY IN PLASTIC WASTE MANAGEMENT

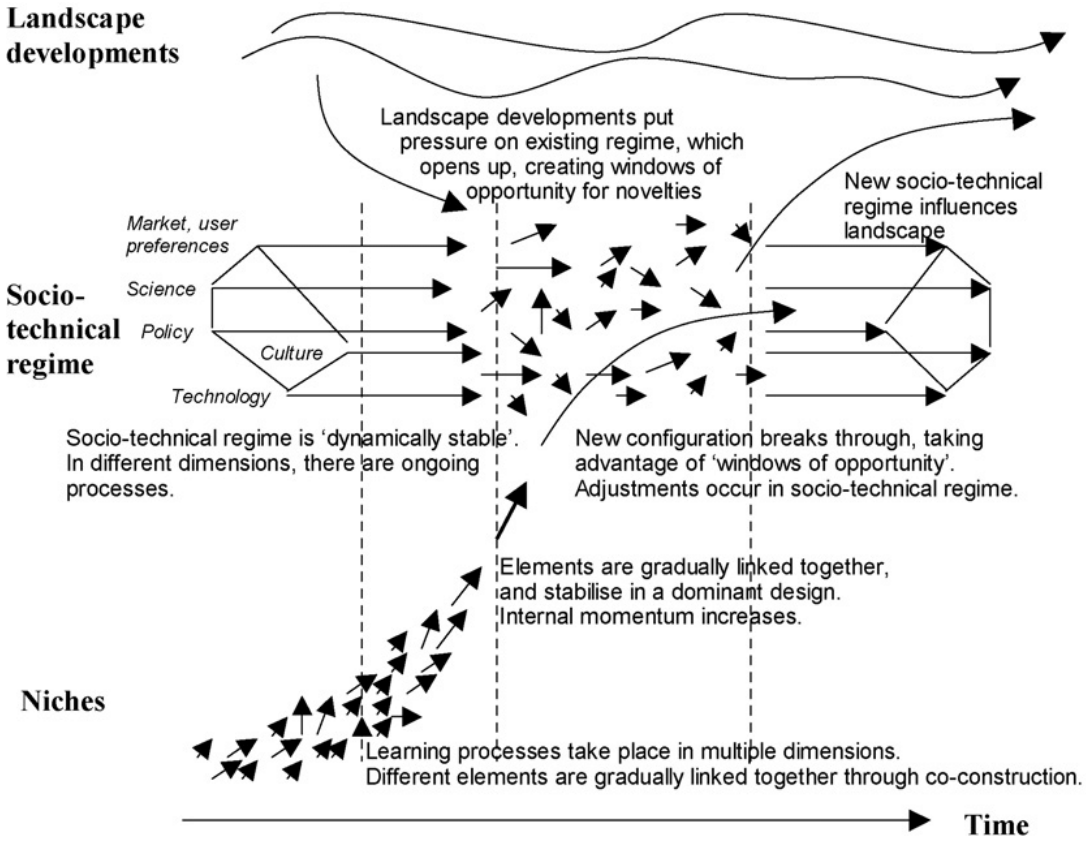
The circular economy (CE) is a sustainable economic model that helps in minimizing the negative environmental impacts of waste and enhances social and economic benefits through the efficient use of resources (Gunasekaran & Spalanzani, 2011; Fernandez et al., 2010; Tsai et al., 2009). According to de Jesus et al. (2018), CE allows the shift from a take-make-dispose model to new ways of production and consumption. They added that common characteristics that come out in circular models are (1) the use of regenerative resources such as renewables and non-hazardous materials; (2) business models that design out waste like repair, remanufacturing, reuse, and sharing; and (3) waste valorization and minimization through RL. Its success depends on implementing ethical and sustainable production and consumption practices. Reverse logistics (RL) is a key component of CE that plays a crucial role in driving sustainable production and consumption by efficiently collecting, transporting, and disposing of waste (Makarova et al., 2021; Agrawal, 2015; Rogers & Tibben-Lembke, 1999; Stock, 1992). RL aims to recover resources from end-of-life products and redirect them back into the production cycle, reducing waste, minimize resources extraction from the nature, and ultimately, mitigating environmental harm (Kumar & Putnam, 2008; Wilson & Goffnet, 2022).

The field of sustainability transition studies is an interdisciplinary and continuously evolving area of research aimed at comprehending and promoting the transition toward more sustainable societal systems (Markard et al., 2012). As we aim towards a circular economy (CE) and the adoption of reverse logistics (RL) for plastic waste management, it is necessary to study the transitions at a socio-technical level, which considers the complex interplay between technological advancements, institutional structures, policies, and other social factors (Köhler et al., 2019). This paper seeks to investigate the enabling environment or the "Protective Space" that makes RL work, the “Narratives of Change” that influence the emergence and survival of this social innovation, and ultimately analyze how RL can become the primary method of managing plastic waste in developing countries through multi-actor collaboration.

2.1. Theoretical Approaches to Analyze Transition to Reverse Logistics

To better understand the terminologies used, we will first define the socio-technical levels where innovation takes place, namely the niche, regime, and landscape (see Multi-Level Perspective by Markard & Truffer, 2008). Niches refer to the grassroots level of society where innovations and practices emerge. Niche actors experiment and develop new technologies, practices, and behaviors that challenge the dominant regime. The niche level is where RLOs start experimenting with new solutions to plastic waste. The next level is the socio-technical regimes, composed of a set of dominant rules, agendas, guiding principles, government regulations, and the participation of regime actors. Although regimes tend to be stable, niche innovations can interact with and potentially alter the current regime's norms, relationships, and structures (Geels, 2005; Rip & Kemp, 1998). RLOs seek to disrupt and hopefully transform the current regime of waste disposal. The last level is the landscape, representing the macro-level environment that pressures and modifies regimes (Geels, 2002). Landscape forces that alter the conversations around plastic waste include climate change, widespread plastic pollution, transboundary policy instruments, and market pressures.

Figure 1. Multi-Level Perspective Framework



Source: Geels, 2002

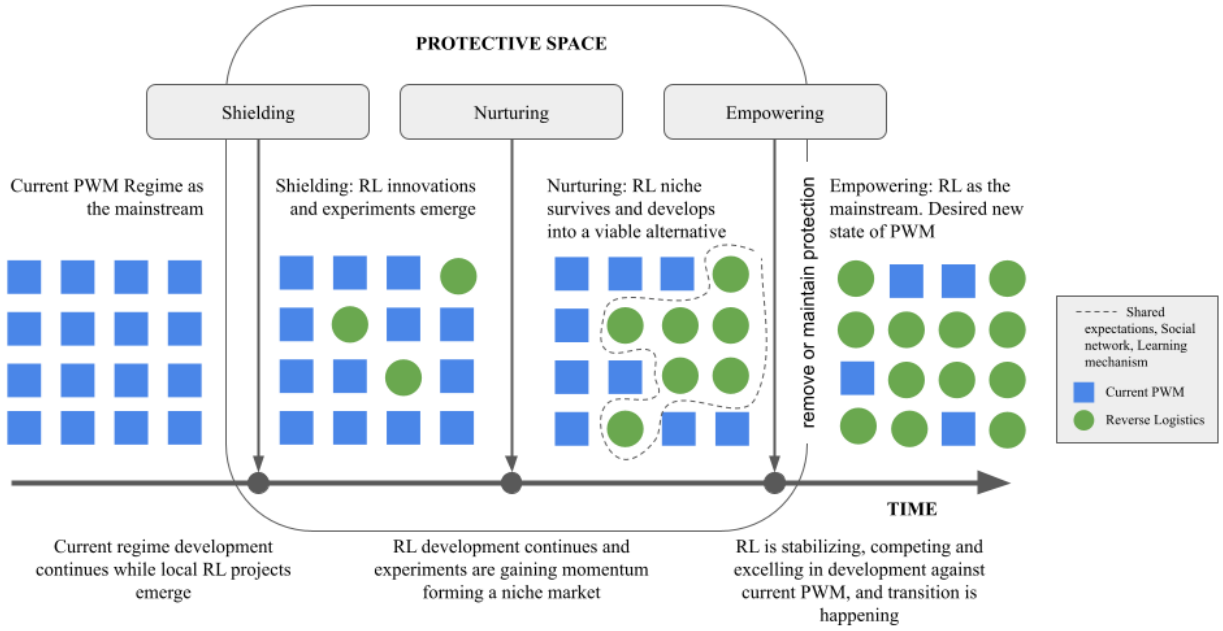
2.1.1. Protective Space for Reverse Logistics

Effective waste management is crucial to sustainable development. According to Kaza et al. (2018), sustainable waste management involves reducing, reusing, and recycling waste while minimizing its negative impacts on human health and the environment. However, solid waste management often does not receive the strategic importance it deserves (ibid). Furthermore, focusing solely on solid waste management is not enough to shift toward a sustainable and inclusive society. Creating and managing an enabling environment or Protective Space is critical to foster breakthrough innovations and ensuring that solutions can withstand threats as they develop and mature.

Smith & Raven (2012) suggests that Protective Space must have mechanisms to ensure niche innovation like RL emerge, develop, and thrive. This includes (1) **shielding** the innovation from

the pressures of competitive markets, powerful institutions, or entrenched interests; (2) **nurturing** the innovation to continuously develop through the articulation of expectations, the building of social networks, and knowledge generation and exchanges; and (3) **empowering** the innovation and actors to undermine the existing regime (Elzen et al., 1996). The Protective Space creates a support system around the innovation, allowing it to develop and adapt to different circumstances without being immediately subject to competition. This can be done through the creation of supportive conditions such as funding, public policy, clear and accessible communication channels, capacity-building opportunities, and institutional support. This allows the innovation to gain traction and increase its chances of survival through co-creating approaches, accelerating the shift toward innovation (Kemp et al., 2007; Loorbach & Rotmans, 2006). Verhees et al. (2012) suggest a matrix (see Table 1) to operationalize the concepts of shielding, nurturing, and empowering, which helps answer the question: How can RL become the dominant plastic waste management solution and provide a pathway for sustainable production and consumption?

Figure 2. Analytical Illustration of Strategic Niche Management in the Context of Reverse Logistics (RL) for Plastic Waste Management (PWM)



Source: Analytical illustration adapted from Susur et al. (2019)

Shielding refers to the processes and instruments protecting innovations from established rules, criteria, or competition. This protection can come from a range of sources, including supportive policy instruments, legal frameworks, and social movements. Shielding mechanisms can be both formal and informal and may involve the creation of specific institutions or policies that protect niche innovations from market or political pressures (Raven et al., 2016). This paper is interested in finding evidence that demonstrates activities or instruments that protect RL from the mainstream selection pressures, such as but not limited to:

- mobilizing pre-existing support mechanisms
- implementing the innovation in favorable (geographic) locations and conditions
- temporary rule exemptions for innovation
- tolerating 'poor' economic/technological performance

Nurturing, on the other hand, refers to internal processes that support the development of path-breaking innovations. When established, protective spaces provide an opportunity for nurturing and strengthening emerging innovations. According to Elzen et al. (1996), the strength of the niche is a result of the interplay between three internal processes. Here, the study will look for evidence of

- Articulating and negotiating shared expectations by the participating actors to give direction and legitimacy to the niche
- Growing social network including all relevant types of actors within the niche creates opportunities for stakeholder interactions and a micro-market that provides the resources necessary for experimentation and temporary protection
- Learning mechanism for establishing new rules and design heuristics.

Strategic Niche Management (SNM) argues that the better these three processes and their interactions are, the greater the chance the innovation will develop into a market niche, influence the existing regime, and become a viable alternative to the incumbents and can provide the path to sustainable transition (Susur et al., 2019). Looking for these internal niche processes would inform us on how nurturing happens for and around RLOs.

Lastly, **empowering** is about creating an environment that allows innovators to challenge and influence the existing regime. Smith and Raven (2012) argued that for sustainable innovations to 'break through,' both the innovation and the innovator need to be empowered – the RL and the RLOs. Providing innovators with the necessary resources, networks, and knowledge to scale up their innovations would lead to realization of their mission and a broader impact. They also described the "*fit and conform*" and "*stretch and transform*" are the two different ways niche innovations are empowered to compete against incumbents (Ibid.).

- ***Fit and conform*** refers to the idea that niche innovation aligns with the existing selection process. Once shielding is removed, it can take on the competition without the need to radically change the established rules. Instead of changing rules, empowering may happen by
    - Promoting that innovation will be competitive under conventional criteria
    - Highlighting performance improvement with conventional criteria
    - Arguing that no radical changes are needed
    - Shielding is only temporary
- ***Stretch and transform*** is when the niche innovation changes the conventional rules to achieve institutional reforms. This path requires that the broader adoption of new rules be implemented. This path could imply that
    - Achieving institutional reforms can only be achieved by changing the rules
    - Old practices will return if the Shielding is removed thus maintaining it is crucial to completely shift toward sustainable values
    - Nurturing is a mandatory step toward sustainability

Table 1. Concepts, functions, and indicators for analysis of Protective Space

SUPPORT	DESCRIPTION	LOOK FOR EVIDENCE RELATED TO:
Shielding	Stave off pressures from mainstream selection environments and create space for	● mobilizing pre-existing generic support ● implementing the innovation in favorable (geographic) locations ● temporary rule exemptions for innovation ● tolerating 'poor' economic/technological

	experimentation	performance
Nurturing	Improve socio-technical / economic performance of shielded innovation	● articulation of expectations and shared vision ● building of broad and deep social networks ● creation and enriching learning culture
Empowering	Remove shielding: innovation succeeds under conventional selection criteria (fit and conform)	● promoting that innovation will be competitive under conventional criteria ● arguing that no radical changes are required ● framing shielding as temporary ● framing nurturing as targeting performance improvement
	Institutionalize shielding: innovation changes conventional selection criteria (stretch and transform)	● arguing for and achieving institutional reforms ● framing shielding as a manifestation of sustainable values ● framing nurturing as a learning process towards sustainability

Source: Verhees et al., 2012

2.1.2. Narratives of Change from Multi-Actor Perspective

The Narrative of Change by Flor Avelino et al. (2018) is rooted in the Transformative Social Innovation Theory (TRANSIT), which seeks to understand and facilitate the transformative change toward more sustainable, just, and resilient societies (Avelino et al., 2019). TRANSIT posits that transformative change is characterized by fundamental shifts in social relations, practices, and institutions, leading to a new societal paradigm (Geels, 2019; Schot et al., 2017).

Narratives are "shared stories, myths, or metaphors that shape how people understand and interact with the world around them" (Wittmayer et al., 2019; Avelino et al., 2018). Narratives can enable or constrain change by providing meaning, identity, and direction to individuals and groups (Avelino et al., 2018; Sengers et al., 2015). Another focus of our inquiry lies in the Narratives of Change told by individuals and entities. To analyze the content of these narratives, we need to understand the following: Who is responsible for what action, when and where is it taking place, how is it being accomplished, and why? For this purpose, Wittmayer et al. (2015) and Wittmayer et al. (2019) propose three particularly significant elements for the study: Content of Narrative, Construction of Narrative, and Role of Narrative.

- **Content of Narrative –** refers to the story or message that is being conveyed about the plastic waste problem. This includes the context, actors, and plot. The context refers to the background information and circumstances surrounding the plastic waste problem. The actors refer to the individuals or organizations involved in managing plastic waste. The plot refers to the current landscape in which the regime actors and niche levels participate (e.g., sequence of events and actions taken to address the plastic waste problem).
    - Context – Plastic waste problem, that plastic waste is not properly segregated and recycled due to (1) weak policy implementation, (2) inadequate infrastructure, and (3) lack of awareness and motivation
    - Actors – reverse logistics organizations (RLOs), local government units (LGUs), fast-moving consumer goods companies (FMCGs), homeowners associations (HOAs)
    - Plot – Climate change, degradation of biodiversity, exhaustion of natural resources, polluted surroundings, health risks, international agreement, global protests and movements seeking more accountability, national laws to curb plastic waste and mismanagement, private sector initiatives, technological advancements, etc.
- **Construction of Narrative –** refers to the process by which actors engage in activities to construct a shared narrative of change. This can involve collaboration and communication among actors to develop a common understanding of the plastic waste problem and a shared vision for addressing it. The Construction of Narrative can also

involve using information and communication technologies and infrastructures to facilitate sharing of information and ideas. The construction of narrative can also involve the relationship between the narrative of change and dominant societal narratives. This can involve challenging or reinforcing dominant narratives or presenting alternative narratives that offer new perspectives on the plastic waste problem. This section supports the internal niche processes under the Protective Space framework.

- **Role of Narrative –** refers to the purpose or function of the narrative in managing plastic waste and promoting societal transformation. Social innovation initiatives may ascribe various roles to their narratives and narrative practices. For example, narratives may be used to raise awareness about the plastic waste problem, educate people about sustainable waste management practices, motivate action to reduce plastic waste, or influence policy to promote more sustainable waste management. Likewise, lobbyists can use narratives to support fossil fuels further or enable business as usual. The Narratives of Change of RL and RLOs can significantly influence societal transformation processes. These narratives can challenge dominant societal discourse and promote more sustainable practices by presenting new perspectives and alternative solutions to the plastic waste problem. Narratives can also serve as a battlecry for collaboration among actors working toward a common goal.

Table 2. Elements for analysis of Narratives of Change

ELEMENT	**DESCRIPTION**	
Content of narrative	Why does the world have to change? (Context)	● What are the current problems? ● What is the desired future?
	Who are the relevant actors? (Actors)	● Who are the actors working towards the desired future? ● Who are the actors opposing or counteracting the desired future?
	How is the desired	● What developments and activities lead to the

	future achieved? (Plot)	desired future? ● When and where do these take place?
Construction of narrative	How are narratives of change constructed?	● What activities do actors engage in to construct a shared narrative of change? ● How do narratives of change relate to dominant societal narratives? ● In what ways is narrative construction mediated by information and communication technologies and infrastructures?
Role of narrative	What role do narratives of change play in social change processes?	● What roles do social innovation initiatives ascribe to their narratives/ narrative practices? ● What roles do narratives of change of social innovation initiatives play in societal transformation processes?

Source: Wittmayer et al. 2019

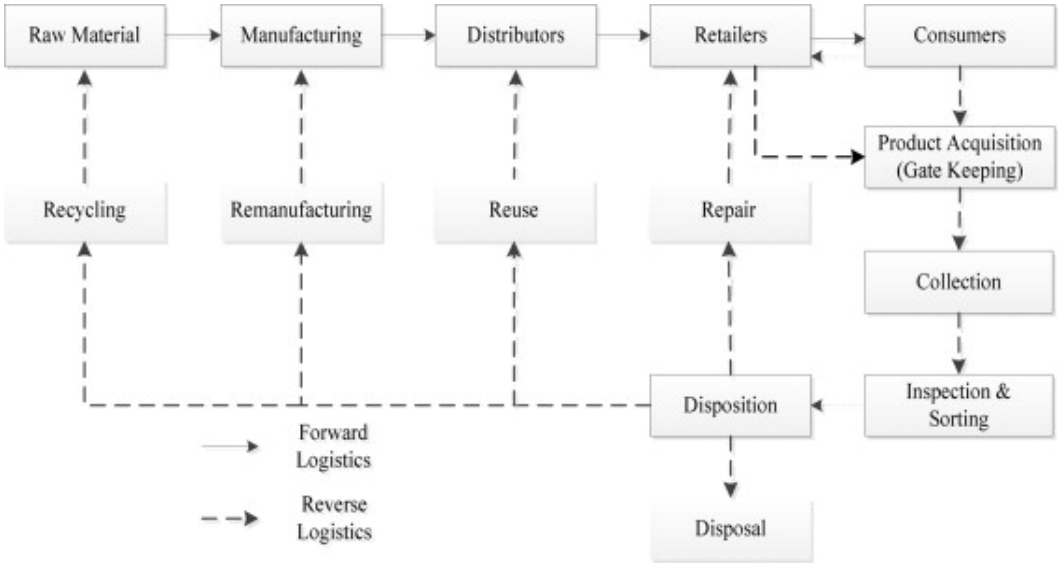
The combination of Narratives of Change and Protective Spaces theories can provide a useful framework for investigating the success factors of RLOs in managing plastic waste, especially in developing countries like the Philippines. By examining the narratives RLOs and regime actors used to shape collective action and co-create enabling environment for niche innovations, this study can shed light on how to catalyze the transition from the current waste management system to reverse logistics in the Philippines. By analyzing the role of collaboration between RLOs and other regime actors, the study can identify ways to create a foundation that supports the adoption of circular plastic waste management practices.

2.2. Rationale for Reverse Logistics in Developing Countries

The complexity of RL involves a network of processes and activities, including collection, inspection, treatment, and the transportation of materials and products to their final destination (Srivastava, 2008). It is differentiated through the backward flow of goods from consumers to

manufacturers for reprocessing or proper disposal (Rogers & Tibben-Lembke, 1999). In this study, reverse logistics organizations (RLOs) will be the entities that execute the RL activities. As a niche, immature industry, we consider that RLOs may do one, multiple, or all RL activities. For example, one RLO may only do the product acquisition and collection while another organization does the sorting and disposition for recycling; there may also be organizations that can do all from acquisition to recycling. This is the reality of the RL industry in developing countries.

Figure 3. Reverse Logistics Model



Source: Agrawal et al., 2015

RL is crucial in developing nations where poorly maintained and frequently congested waste sites are visible. On top of that, waste collected for landfilling is plagued with issues of leakage. In some developing countries, a large volume of leakage typically comes from waste already collected by haulers and garbage trucks (Ocean Conservancy, 2015). For example, in developing countries in Southeast Asia, household garbage is brought to landfills and illegal dumpsites in or near beaches, riverbanks, and roadsides, particularly in rural areas (Miller & Howell, 2019). Many studies point to root causes like ineffective enforcement mechanisms, lack of accountability across various government agencies, low managerial and technical skills, low commitment to solid waste management plans, and minimal monitoring among others

(Gamaralalage et al., 2015; Larsen et al., 2011; Christie et al., 2005; Lowry et al., 2005; Domingo & Manejar, 2021).

RL can help fill the gaps in policy implementation because, by design, its core function is to intercept waste at source and keep materials in the loop. If successful, it will have an immense environmental impact by minimizing extraction of natural resources and generation of waste, ultimately reducing harm to biodiversity and the planet (Graczyk & Witkowski, 2011). It can also generate green jobs and contribute to the economy (Mwanza et al., 2017; Gutberlet, 2018; Gower & Schröder, 2016). Ocean Conservancy (2020) published a report acknowledging that in places where plastic pollution is more acute, communities and the informal waste sector are crucial and even considered the frontline in the fight against plastic waste. By returning waste to its original manufacturer or diverting it away from landfills, incineration, or the environment, reverse logistics can create new specialized jobs in the waste management sector (Pumpinyo & Nitivattananon, 2014).

Professionalizing the informal sector is one of the goals of some Reverse Logistics Organizations (RLOs). These RLOs may include non-governmental organizations (NGOs), community-based organizations (CBOs), and Social Enterprises (SEs). As a collective, they are called the Third Sector. The Third Sector, defined as the collection of organizations and entities that operate outside of government and the private sector, plays a crucial role in developing effective solutions to address social and environmental issues (Evers & Laville, 2004). Below are just some examples of RLOs in Southeast Asia and their contributions.

Indonesia

1. Bank Sampah Malang (BSM)[1]: began as a local government project turned community-based organization that aims to reduce plastic waste by applying the 3R concept (reduce, reuse, and recycle). They specialized in collecting plastic, particularly plastic bottles. Between 2014 and 2019, BSM collected and recycled more than 1.2

[1] Bank Sampah Malang loosely means Malang City Waste Bank. More information available at https://banksampahmalang.com/

million kg of plastic bottles, saving about 3.6 million kg of CO2 emissions and generating about 1.8 billion IDR of income for the waste collectors (Garside et al., 2020).

2. Waste4Change[2]: a social enterprise that provides waste management solutions, including RL for plastic waste. Since its establishment in 2014, they have collected 1,000 tons of plastic from households, offices, and companies; turned 300 tons of plastic waste into products; and improved 20 local communities to improve their waste management practices.

Thailand

3. Trash Hero Tha Sala[3]: a chapter of Trash Hero based in Thailand, founded in 2022. Since then, they have had 30 clean-ups, with 1,115 volunteers, collecting nearly 3,500kg of waste while recycling around 500kg.
4. Separation Centers in Bangkok[4]: a cooperative-like franchise that conducts RL in Thailand wherein they collect waste from downstream, manage it, and divert them upstream. Pumpinyo & Nitivattananon (2014) highlighted that their practices are more efficient than other plastic waste management practices. Chivakidakarn (2008) found that aids from waste policy specialists, infrastructure to support material separation, and the level of cooperation between the public and private recycling sector in the source separation program are important factors in the success of the "separation centers" in some Thai municipalities.

Vietnam

5. GreenHub Vietnam: non-profit organization focusing on environmental conservation and sustainable development in Vietnam. In Ha Long City, they led a project that collected 265 tons of plastic waste, with 47 tons recycled to construct benches and flower beds GreenHub (2021).
6. Rethink Plastic Vietnam[5]: a social enterprise that provides waste management solutions, including RL for plastic waste. They collect and sort plastic waste from households and businesses and ensure that the waste is recycled or processed in an environmentally friendly manner.

[2] More information available at https://waste4change.com/?lang=en
[3] Tha Sala is a district in Chiang Mai, Thailand. More information available at https://trashhero.org/country/thailand/
[4] Cover story: https://www.taipeitimes.com/News/biz/archives/2013/01/06/2003551845
[5] More information available at https://www.rethinkplasticvietnam.com/

The focus on developing countries in Southeast Asia is motivated by studies ranking the region as the top plastic polluter in the world. Despite the initiatives of RLOs, Jambeck et al. (2015) ranked five Southeast Asian countries in its top 10 countries with the most contribution to marine plastic waste. With a total of 1.33 - 3.55 million metric tons (MMT) per year (see Table 3), they are Indonesia (2nd), the Philippines (3rd), Vietnam (4th), Thailand (6th), and Malaysia (8th).

Table 3. Top 10 countries ranked by mass of mismanaged plastic waste

Country	Coastal Population (in millions)	Waste Generation Rate (kg/person/day)	% of plastic waste	% of total mismanaged plastic waste	Mismanaged plastic waste (million metric tons/year)	Plastic marine debris - low (million metric tons/year)	Plastic marine debris - high (million metric tons/year)
China	262.9	1.1	11.0%	27.7%	8.82	1.32	3.53
Indonesia	187.2	0.52	11.0%	10.1%	**3.22**	**0.48**	**1.29**
Philippines	83.4	0.5	15.0%	5.9%	**1.88**	**0.28**	**0.75**
Vietnam	55.9	0.79	13.0%	5.8%	**1.83**	**0.28**	**0.73**
Sri Lanka	14.6	5.1	7.0%	5.0%	1.59	0.24	0.64
Thailand	26	1.2	12.0%	3.2%	**1.03**	**0.15**	**0.41**
Egypt	21.8	1.37	13.0%	3.0%	0.97	0.15	0.39
Malaysia	22.9	1.52	13.0%	2.9%	**0.94**	**0.14**	**0.37**
Nigeria	27.5	0.79	5.0%	2.7%	0.85	0.13	0.34
Bangladesh	709	0.43	8.0%	2.5%	0.79	0.12	0.31

Source: Jambeck et al., 2015

Meijer et al. (2021) supported it with another list of countries with the highest plastic emission via riverine sources wherein the Southeast Asian countries remain a top concern, with the Philippines (1st) being the worst polluter of all. Together with Malaysia (3rd), Indonesia (5th), Myanmar (6th), Vietnam (8th), and Thailand (10th), the region has 863 out of 1656 most polluting rivers and watersheds in the world (see Table 3). This shows that RL is crucial,

particularly in developing countries where waste disposal is often overlooked, infrastructure is limited, awareness is low, and policies are not implemented effectively (Gutberlet, 2018).

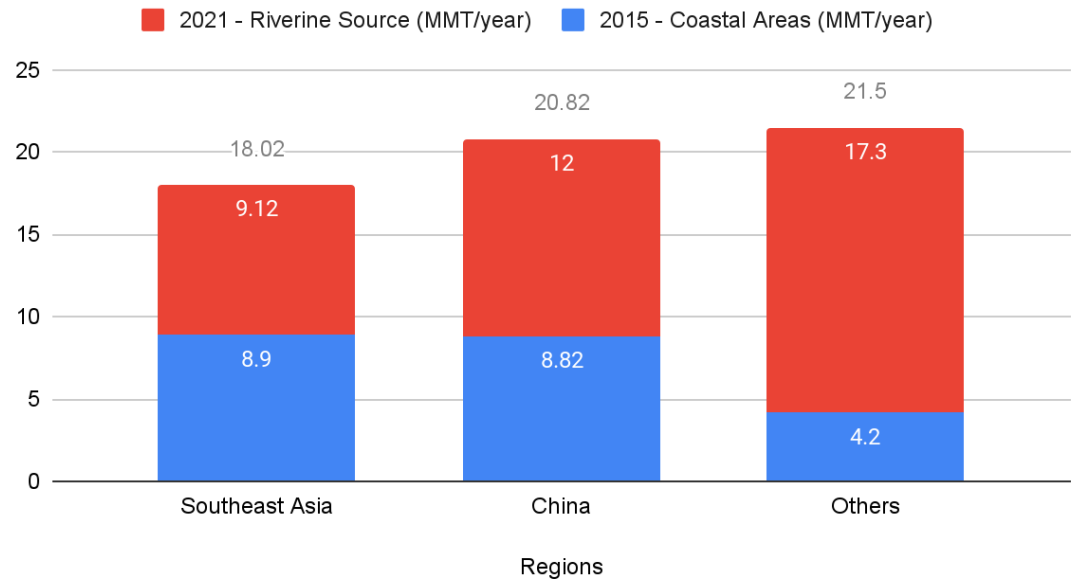
Table 4. Top 10 countries ranked by mass of plastic emission via riverine source

Country	Mismanaged plastic waste (million metric tons/year)	Plastic emission to ocean (million metric tons/year)	Ratio of MPW reaching the ocean	Average emission probability (%)	Total number of rivers contributing to global plastic emission	Number of rivers contributing to 80% of global plastic emission
Philippines	**4**	**0.36**	8.9%	7.2%	4820	466
India	13	0.13	1.0%	0.5%	1169	211
Malaysia	**0.81**	**0.073**	9.0%	4.4%	1070	105
China	12	0.071	0.6%	0.2%	1309	139
Indonesia	**0.82**	**0.056**	6.8%	4.4%	5540	105
Myanmar	**0.99**	**0.04**	4.0%	1.7%	1596	71
Brazil	3.3	0.038	1.1%	0.2%	1240	75
Vietnam	**1.1**	**0.028**	2.5%	1.6%	490	68
Bangladesh	1	0.025	2.4%	2.3%	588	36
Thailand	**1.4**	**0.023**	1.7%	0.9%	624	48

Source: Meijer et al., 2021

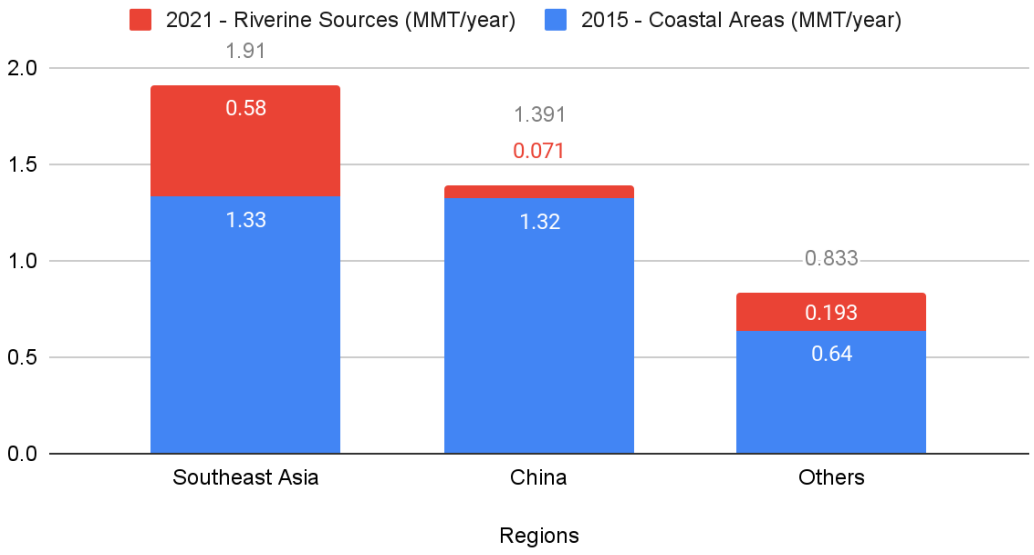
RLOs in Southeast Asia face several challenges in terms of operation and scaling up. Gutberlet (2018) pointed to the lack of adequate facilities, weak policy implementation, and the absence of proper local waste management systems are often the main barriers to RL.

Figure 4. Accumulated mismanaged plastic waste (million metric tons/year) per region in the top 10, riverine sources (2021) and coastal areas (2015)



Source: Jambeck et al., 2015; Meijer et al., 2021

Figure 5. Accumulated plastic marine debris (million metric tons/year) per region in the top 10, riverine sources (2021) and coastal areas (2015).



Source: Jambeck et al., 2015; Meijer et al., 2021

Inadequate infrastructure includes poor transportation systems and insufficient waste management facilities. RLOs may need help to collect waste and transport it to recycling facilities, leading to a backlog of materials and reduced efficiency. There is also a need for more access to financing facilities. RLOs often operate on a small scale and may need access to sufficient funding to invest in equipment and technology needed to scale up operations. This lack of funding also limits their ability to pay fair wages to workers, which can lead to difficulty in attracting and retaining skilled staff (Ghiani et al., 2013).

New policies have been passed, and initiatives have been implemented to help improve waste management and recycling rates, improving RL. For example, Thailand has introduced a plastic waste management roadmap that aims to increase the recycling rate of plastic waste to 50% by 2027 (Pakpahan et al., 2020). In 2018, Indonesia launched a national action plan on marine debris, which includes measures to improve waste management and reduce plastic waste (United Nations, 2018). On the other hand, Vietnam has implemented several initiatives to address the issue, including a ban on plastic bags in some areas and establishing a national action plan on marine plastic debris (Pham et al., 2021). However, the implementation of policies and initiatives to address plastic waste in Southeast Asia faces several challenges, such as limited enforcement. In Indonesia, the implementation of the ban on single-use plastics has been hindered by weak enforcement due to a lack of resources and coordination among local governments (Hidayati et al., 2020).

Finally, a lack of awareness and public education on the importance of waste reduction and recycling can limit the impact of RLOs. In many Southeast Asian countries, single-use plastics are deeply ingrained in cultural attitudes toward convenience and food hygiene, making it difficult to shift to more sustainable alternatives (Pramudya et al., 2021a; Pramudya et al., 2021b).

Thus, to address these challenges, it is important to prioritize the development of infrastructure, enhance policy implementation and enforcement, provide adequate funding and financing support to RLOs, and invest in comprehensive public education and awareness campaigns. By

tackling these issues collectively, it is possible to create a more sustainable and environmentally conscious future, reducing the adverse impact of plastic pollution.

3. RESEARCH METHODOLOGY

This qualitative case study research is carried out via a review of related documents and semi-structured interviews. Case study research is appropriate for the early exploratory study stage (Rowley, 2002) and helps to understand new issues (Yin, 2009), such as the RL and CE in its real-life context. Bhandari (2023) argues that the qualitative approach would help preserve respondents' voices and perspectives and adapt to new ideas or patterns that emerge during the research process. By using multiple sources of evidence such as interviews, documents, and observations, a qualitative case study can provide rich and detailed descriptions of how CE practices are implemented and what challenges and benefits they entail. However, it is noted that there is a possibility that the participants may change their behavior or responses because they know they are being observed or studied, a common challenge in conducting qualitative research (McCambridge et al., 2014).

The selection of interviewees was guided by TRANSIT, from different regime actors in the waste management ecosystem, particularly the local government units (LGUs), company representatives from the fast-moving consumer goods (FMCGs) industry, homeowners associations (HOAs), and reverse logistics organizations (RLOs). These entities on the ground directly influence the narratives of the local waste management systems and sustainability transition of RL as a compelling alternative.

Table 6. Logic for the selection of the key respondents to be interviewed

TRANSIT	**Classification of Interviewee**	**Interviewee**
Third Sector	Reverse logistics organizations that establish collection centers in multiple locations (cities/municipalities)	Republik Junk (social enterprise), Alon and Araw (community-based organization), Sentinel Upcycling (social enterprise), and Green Antz (Social enterprise)
Government	Local government units that have local ordinances related to any point of reverse logistics, from segregation, collection, to diversion	Local government units (LGUs) of the City of Bacoor, Municipality of Balayan, and Municipality of Taytay,

Communities	Homeowners association that have a waste segregation policy or resolution within their community and have plans to build or have existing materials recovery facilities (MRF)	Homeowners associations (HOAs) of Mary Homes Subdivision and Addas 2C
Companies	Fast-moving consumer goods companies that have committed to collecting plastic as a form of CSR, ESG, compliance to EPR, or a plastic neutrality initiative	San Miguel Corporation

Source: Author

The data gathered will be analyzed to form a list of **Shared Vision and Action**. Witkamp et al. (2011) suggested that identifying the shared values between the niche and the regime can better understand their compatibility and anticipate potential conflicts. The questions are designed to extract the narratives that will help create an enabling environment or Protective Space for RLOs in managing plastic waste in the Philippines:

Narrative Analysis: This step involves analyzing the existing narratives of change around plastic waste management in the Philippines. This includes examining the common narratives among LGUs, FMCGs, and HOAs and how they frame the problem of plastic waste. The analysis will also explore how these narratives align with the CE agenda or plastic waste recovery and the role of RLOs in achieving them.

Stakeholder Engagement: This step involves engaging with regime actors to build consensus and commitment around the new Narratives of Change. This includes identifying key champions and change agents within each regime actor group and mobilizing support for the new narratives. Conflicting values and interests are inevitable and may surface in this section, hindering the creation of Protective Space. This means that the engagement process should also address any barriers or concerns that stakeholders may have regarding adopting circular plastic waste management practices and the role of RLOs.

Protective Space Creation: Based on the new narratives of change and stakeholder engagement, this step involves creating an enabling environment or Protective Space for RLOs to operate. This includes creating the necessary institutional, social, and physical conditions that allow

RLOs to test, learn, and innovate new models without fear of failure or retribution. The Protective Space should also enable RLOs to collaborate with other regime actors and access the necessary resources and support to scale their operations. We can look at the commitments and resources mobilized.

4. RESULTS AND DISCUSSIONS

The Philippines' Ecological Solid Waste Management Act of 2000, also known as Republic Act 9003 (RA 9003), puts at its core the value of segregation and recycling. The law sets the guidelines "*for solid waste avoidance and volume reduction through source reduction and waste minimization measures, including composting, recycling, re-use, recovery …before collection, treatment, and disposal …in accordance with ecologically sustainable development principles*" (Republic of the Philippines, 2001). Yet, the country still generates a huge amount of plastic waste that ends up in landfills, waterways, and oceans. To address this issue, the government passed Republic Act 11898 (RA 11898) or the Extended Producer Responsibility Act of 2022, a law that requires big companies to establish a mechanism for the recovery of their plastic packaging waste (Republic of the Philippines, 2022). It states that these companies are required to recover, treat, recycle, or dispose of the products and packaging they sold to the market after consumption by the consumer. By making companies responsible for their plastic packaging waste, the law aims to reduce the burden on local government units and communities who have been struggling to manage their solid waste.

Now, with the Extended Producer Responsibility (EPR) law in place, the priority has shifted from waste management to "*who is accountable for the plastic waste generation*" (Interview 2). The EPR law's challenge now is how to enforce it as the previous policy has seen "*disappointing*" results (Interviews 1, 2). For example, RA 9003 had a goal that each *barangay* (village) must have a materials recovery facility (MRF)[6], but out of over 42,000 potential MRF sites, only 10,300 have been built since then until 2018 (Domingo & Manejar, 2021) and in the author's best effort, there is no updated, nationwide auditing of which one is operating and how many are being built every year. But according to Environmental National Bureau (EMB) - National Capital Region (NCR), from 99 MRFs built by the Department of Environment and Natural Resources (DENR) in NCR between 2012 to 2018, only 28 remain functional[7] (DENR-EMB, n.d.). Given this track record, there is "*cautious optimism*" (Interview 3) from the RLOs and regime actors on the implementation of the EPR law.

[6] Materials recovery facility is a structure designed to receive, sort, and/or temporarily store recyclables
[7] More information available at https://ncr.emb.gov.ph/materialsrecoveryfacilitymrf/

Below are the key actors interviewed for this study.

Reverse Logistics Organization (RLO)

1. Founder at Republik Junk – Republik Junk[8] is a social enterprise that transforms waste into wealth. Based in Cagayan de Oro City, it promotes environmental awareness and community empowerment by offering cash incentives for recyclables. Through its innovative Communal Trash to Cash Bins, it provides a convenient and accessible way for people to segregate and dispose of their trash responsibly.
2. Founder at Alon and Araw Club – Alon and Araw Club[9] (Wave and Sun Club) is a non-profit organization that aims to protect the ocean and empower the children of coastal communities in Cabangan, Zambales, Philippines. They organize beach clean-ups, plastic waste recovery activities, and free surf lessons for the participants. They also provide educational support, livelihood opportunities, and environmental awareness for the community.
3. Executive at Sentinel Upcycling Technologies – Sentinel Upcycling Technologies[10] is a plastic manufacturer based in Quezon City, Philippines. It is dedicated to turning low-value plastic waste, such as foil sachets, plastic bottles and tarpaulin, into higher-value durable products. Some of the products it offers are pallets, crates, tote boxes, hangers, furniture, trays, and trash bins. Sentinel Upcycling Technologies aims to close the plastic cycle and drive the plastics CE by partnering with local industry players and consumers.
4. Hub Administrator at Green Antz Collection Hub – Green Antz[11] is a CE and innovation group that aims to reduce plastic waste and transform it into various types of construction materials. Some of their products include ecobricks, pavers, and pre-casts. Green Antz works with multiple partners from different sectors to create a sustainable and inclusive ecosystem for waste management and circularity.

Local Government Units (LGUs)

[8] More information available at https://republikjunk.wixsite.com/republikjunk
[9] More information available at https://alonandarawclub.org/
[10] More information available at https://sentinelupcycling.com.ph/
[11] More information available at https://www.greenantz.com/

5. Environment Officer at the City Environment and Natural Resources Officer (CENRO) of the City of Bacoor – Bacoor City[12], Cavite, Philippines is a coastal municipality that faces the challenge of managing its plastic waste. The CENRO is the primary department responsible for protecting the environment and enforcing existing environmental laws.
6. Environment Officer at the Municipality Environment and Natural Resources Officer (MENRO) of the Municipality of Balayan – Balayan, Batangas[13] is a municipality in the province of Batangas, Philippines. It is located near the Verde Passage, one of the most biodiverse marine areas in the world. It has the same function as the CENRO in the municipality.
7. Environment Committee Head at the Local Council of Municipality of Taytay – Taytay[14] is a first-class municipality in the province of Rizal, Philippines and is known as the Garments Capital of the Philippines because of its thriving garment industry. Taytay is surrounded by rivers, creeks, and the Taytay floodway. The Taytay Floodway is a vital infrastructure that helps prevent flooding in Metro Manila and nearby areas.

Homeowners Association (HOAs)

8. Committee Director at Mary Homes Subdivision HOA[15] and
9. President at Addas 2C Subdivision HOA – are two private communities in Bacoor, Cavite with HOAs that are authorized to make and enforce rules for their respective properties and their residents.

Fast-Moving Consumer Goods Companies (FMCGs)

10. Logistics Officer at San Miguel Corporation (SMC) – SMC[16] is one of the largest and most diversified conglomerates in the Philippines with business units in energy, infrastructure, and consumer goods among others. SMC has been working towards turning plastic into asphalt roads by using single-use plastic along with bitumen to serve as a binder for road construction.

[12] More information available at https://bacoor.gov.ph/
[13] More information available at https://balayan.gov.ph/
[14] More information available athttps://www.taytayrizal.gov.ph/
[15] More information available athttps://www.facebook.com/mhhai.molinoiv/
[16] More information available athttps://www.sanmiguel.com.ph/

4.1. Reverse Logistics in the Philippines

As highlighted in the literature review, the Philippines has been consistently listed among Southeast Asia's top contributors to marine plastic waste, with a total of 1.33 - 3.55 million metric tons per year (Jambeck et al., 2015). Meijer et al. (2021) also supported this claim, stating that the Philippines is the worst polluter of all Southeast Asian countries when it comes to plastic emissions via riverine sources. This issue is compounded by the country's weak implementation of environmental policies and inadequate infrastructure for waste management. Its two-decade-old law to manage waste, the Ecological Solid Waste Management Act of 2000[17], mandated that every *barangay*[18] (village) should have its own materials recovery facility (MRF). *Out of 42,000 barangays in the Philippines, only 10,300 have been built since then until 2018 (Domingo & Manejar, 2021) with some achieving only a limited amount of success (ADB, 2013).* This is considering that the Philippine Government is never short of good policies that support the efforts of proper waste management. The country has a law that puts focus on climate change and environmental stability (Climate Change Act of 2009), a law mandating educational institutions to include environmental consciousness and waste management in their curriculum (National Environmental Awareness Education Act of 2008), and a law that protects the country's water resources from pollution from land-based sources (Philippine Clean Water Act of 2004). Table 5 shows the list of waste management-related Philippine laws.

Table 5. Summary of laws and regulations related to solid waste management

Year	Name	Description
2022	Republic Act 11898 - The Extended Producer Responsibility Act of 2022	An act institutionalizing the extended producer responsibility on plastic products and packaging waste. It is an amendment to the Republic Act No. 9003, also known as the “Ecological Solid Waste Management Act of 2000”
2009	Republic Act 9729 - Climate Change Act	An act mainstreaming climate change into government policy formulations, establishing framework strategy and

[17] More infromation available at https://www.officialgazette.gov.ph/2001/01/26/republic-act-no-9003-s-2001/
[18] A barangay is the smallest political unit in the country. Source: Philippine Statistics Office

	of 2009	program on climate change with a focus on environmental and ecological stability among others
2008	Republic Act 9512 - National Environmental Awareness Education Act of 2008	An act to promote environmental awareness through environmental education
2004	Republic Act 9275 - Philippine Clean Water Act of 2004	An act providing for a comprehensive water quality management
1999	Republic Act 8749 - Clean Air Act	Provides comprehensive air pollution control policy and for other purposes. Section 20 bans the use of incineration for burning municipal, bio-medical, and hazardous waste but allows the traditional method of small-scale community burning.
1999	Republic Act 9003 - Ecological Solid Waste Management Act of 2000	An act providing for an ecological solid waste management program, creating necessary institutional mechanisms, and incentives, declaring certain acts prohibited and providing penalties, appropriating funds
1998	Department Administrative Order No. 98-49	Provides technical guidelines for the proper disposal of municipal solid waste. Devolution of waste disposal functions to local government units
1998	Department Administrative Order No. 98-50	Provides procedures in identifying sanitary landfill sites and screening criteria for municipal solid waste disposal facilities
1991	Republic Act 7160 - The Local Government Code	Mandates LGUs to exercise powers and discharge functions and responsibilities as necessary or appropriate and incidental to the efficient and effective provision of services and facilities related to general hygiene and sanitation,

		beautification, and solid waste collection and disposal systems.
1990	Executive Order No. 432	Orders the strict implementation of PD 825 by all law enforcement agencies and officers. Enjoin the Metro Manila Development Authority (MMDA) to do for Metro Manila
1990	Republic Act 6969 - Toxic Substances and Hazardous and Nuclear Waste Control Act of 1990	Regulates the importation, use, movement, treatment and disposal of toxic chemicals and hazardous and nuclear waste in the Philippines
1978	Presidential Decree No. 1151 - Philippine Environmental Policy	Recognizes the right of the people to a healthy environment, and the duty of everyone to contribute to the preservation and enhancement of the environment. Section 4 requires the preparation of Environmental Impact Statements for any project or undertaking that may significantly affect the environment.
1978	Presidential Decree No. 1152 - Philippine Environmental Code	Requires the preparation and implementation of waste management programs by all provinces, cities, and municipalities
1978	Presidential Decree No. 1586 - Environmental Impact Statement System	Establishing environmental impact statement system, including other environmental management-related measures and for other purposes
1976	Presidential Decree No. 600 (amended by PD 979) - Marine Pollution Control Law of 1976	Prevents and controls the pollution of the seas by prohibiting dumping of waste and other matter that creates hazards to human health or harms living resources and marine life.
1976	Presidential Decree	Provides guidelines and implementing rules and regulations

	No. 984 - Pollution Control Law	for preventing and controlling pollution from solid, toxic, and hazardous wastes.
1975	Presidential Decree No. 825 - Garbage Disposal Law	Provides penalties for improper disposal of garbage and other forms of uncleanliness
1975	Presidential Decree No. 856 - Code of Sanitation	Requires cities and municipalities to provide an efficient collection, transportation, and proper disposal of refuse in food establishments, markets, and abattoirs
1938	Commonwealth Act No. 383 - Anti-Dumping Law	Prohibits dumping of refuse or substances of any kind into rivers

Source: Author's list compiled from the Philippine Gazette[19] website

Aside from the laws providing guidelines on managing plastic waste, the active citizenry of the country is also commendable. Ocean Conservancy published a report in 2019 on the International Coastal Cleanup (ICC) campaign, the world's largest volunteer effort for ocean health. According to the report, the Philippines was the top participating country in the 2018 ICC campaign, with 276,120 volunteers participating in clean-up activities and collecting 362,014 kg of trash (Ocean Conservancy, 2019). The following year, the country also was a top performer, with 280,309 volunteers and 621,117 kg of trash collected (Ocean Conservancy, 2020).

The private sector and the Third Sector are also taking initiatives and efforts to tackle this problem and promote a circular economy for plastics. Some of these include

- Corporations that commit to reducing their plastic footprint and supporting waste recovery programs, such as Coca-Cola Philippines, Nestle Philippines, and other members of The Philippine Alliance for Recycling and Materials Sustainability (PARMS)[20].

[19] The Philippine Gazette is the official journal of the republic of the Philippines. More information available at https://www.officialgazette.gov.ph/

[20] PARMS is a multi-stakeholder organization that focuses on waste management. Its founding members and investing partners include big multi-national companies like Nestle, Coca-Cola, Modelez, TetraPak, and local conglomerates. More information available at https://www.parms.com.ph/

- Social enterprises that collect, process, and transform plastic waste into useful products, such as Green Antz Builders, Plastic Flamingo, Sentinel Upcycling and others.
- NGOs that advocate for environmental education, policy reform and community empowerment, such as Mother Earth Foundation and Save Philippines Seas.

Given the information above, it is clear that it is not the availability of the solutions, the commitment from the companies to be held accountable, the right policies, or citizen participation. A number of reasons may hinder the effective enforcement of waste management regulations in many developing countries like the Philippines and they are interconnected. Even with limited resources, Hoornweg & Bhada-Tata (2012) found that the biggest portion of the budgets of the local governments in developing countries is allocated to waste management which includes capital-intensive infrastructure and day-to-day operations. This is worsened by the increased volume of waste generation because of the pandemic which puts more stress on existing infrastructure and manpower. Another angle for weak policy implementation is the lack of experts in the field of materials recovery. Shahbazi et al. (2016) pointed out that scarcity of knowledge and expertise to implement sustainable modes of waste management is experienced not only in developing but also in developed nations. Oftentimes, the national governments lack programs to build capacity in local government units, link waste-diverted products to the market, or create safety nets and alternative livelihoods for affected constituents such as the informal waste sector (Domingo & Manejar, 2021). Not to mention the cultural embeddedness of plastic in society that may result in resistance to change (Pramudya et al., 2021a; Pramudya et al., 2021b). All these challenges can pile up easily, making circular and sustainable waste management unattractive to pursue, and that may then be overlooked (Gutberlet, 2018).

Looking at the rationales, is it possible that the gap lies in our inability to collaborate and pursue a common vision together? It is not impossible for the public and private sectors to work together to bridge the finances, different stakeholders can collaborate for a sustained and long-term behavioral change campaign, and citizens will participate if given the right infrastructure and programs. With that, this paper believes that RLOs can connect regime actors, align respective values and interests, and also supply the expertise needed to operationalize and enforce the laws.

Imagine a fledgling RLO partners with a community that is underserved by the LGU. The RLO offers to collect and process plastic waste from households and provides incentives for proper waste segregation and recycling. The RLO also collaborates with an FMCG company that has an ESG or plastic neutrality program and sells the recycled products to them or the raw materials to different processors. The FMCG company supports the RLO financially and technically and helps them scale up their operations and impact. The LGU recognizes the benefits of the RLO's services and provides policy support and facilitation to enable its replication in other communities. The RLO becomes a leader in developing innovative solutions for plastic waste reduction and engages more stakeholders in co-creating a CE. In this scenario, the RLO unifies individual interests into one shared mission. At the same time, this is possibly not only exclusive to the Philippine setting but to other developing countries as well. It also shows that while technologies and policies are important in sustainable transitions, relationships and collaboration of niche and regime actors are equally significant to upend the plastic waste problem.

4.2. Description of the existing Protective Space for Reverse Logistics and Reverse Logistics Organization

Current conditions enabling the emergence and development of RLOs (Shielding)

RLOs are considered the frontliners in the fight against plastic waste but they feel that they are "*not widely supported*" (Interview 1) by the regime actors and that the enabling environment is "*far from ideal for [them] to succeed*" (Interview 3).

A big challenge for the RLOs in the Philippines and also in Southeast Asia is **the lack of financing**. Especially the smaller RLOs that do not have access to traditional sources of funding, "*[they] reach out to their local governments and approach different companies to support their plastic recovery initiatives*" (Interview 2). But oftentimes, they get the response that "*[LGUs and companies] do not have the budget or program for that, or plastic recovery is not their priority, or that they'll just simply get back to [them]*" (Interview 2). As a result, these small RLOs scavenge for whatever source of funding available out there like "*startup competitions, grants, and bootstrapping to get something going*" (Interview 1). The more established RLOs may "*have little more cash in the pocket and partnerships that fund some part of the operations, but the main challenge is how to make it sustainable"* (Interview 3). *The products that [RLOs] produce*

are much more expensive compared to regular items because the clean and dry plastic is more expensive to source and there is just not enough demand for the green products" (Interview 3). This demand side is very crucial as it allows the RLOs to be more resilient since "*manpower required to sort the plastics further are expensive and pieces of equipment too are expensive and prone to damages and breakdowns*" (Interview 4). RLOs' financial hurdles stack up right from starting the business to scaling up.

Regime actors can **mobilize pre-existing resources** like manpower, piece of land for the facility, vehicles, or grant funding to alleviate some of the financial burdens of the RLOs. In the interviews, all regime actors have positive anecdotes on how they contribute to making RL happen or helping RLOs. "*LGUs have been consistent in issuing permits, promoting the importance of the ordinances targeting plastic waste, and conducting awareness campaigns*" (Interview 5), the HOAs "*are active in promoting segregation and recycling to homeowners in the subdivision*" (Interviews 8, 9), while the FMCGs' commitment to plastic waste recovery is exemplified by their "*various initiatives on waste diversion and plastic waste reduction*" (Interview 10). All of them also agreed that plastic waste is a huge problem and it "*should be confronted in many directions and in an orchestrated manner*" (Interview 10). But behind those statements and peddled narratives, limited resources, lack of technical capacities to support labor-intensive activities of segregation and recycling, and passivity reveal a disconnection between vision and action.

RLOs believe that LGUs are "*constrained by political dynamics and **competing priorities and interests***" (Interview 4) even though local officials say that "*[they] support plastic waste solutions especially if it benefits [their] constituents*" (Interviews 5, 6). The changes in administration at the local level create uncertainty as to "*what program is going to be supported by the incoming officials*" (Interview 4). HOA officers, likewise, expressed support for the plastic waste initiatives "*but it could be hard to convince the homeowners to pay for one type of service*" (Interview 8). The novelty of RL for plastic and its business model is a challenging proposition for them. "*People are not used to paying for plastic diversion alone*" (Interview 1). HOAs added that "*getting 100% of the community to participate has been very difficult*" (Interview 9) considering that "*they are already paying high monthly association dues and that*

they need to do the segregation themselves" (Interview 9). "*People want full service including collection, sorting, and recycling of recyclables and other types of waste*" (Interview 1). This can be a major barrier as it requires RLOs to invest in expensive equipment and infrastructure. These opposing perspectives can potentially sideline the success of plastic waste initiatives.

The interviews demonstrate that if the "Shield" is not strong, natural selection and social norms will prevail. RL being a niche and unproven solution, and one that comes with some birthing pains, is subject to this selection process. This could potentially result in pushbacks and rejections, especially in moments where RLs' inherent disadvantages manifest such as the additional cost, inconvenience of segregation, and other unintended consequences.

In order to manage these external pressures, Shielding also suggests finding **receptive communities** where RL can be implemented **with less friction and more tolerance to its initial inefficiencies**. HOA officials interviewed expressed willingness to allow RLOs to use their space in the subdivision for the materials recovery facility (MRF). They also volunteered their time to "*promote segregation and recycling from house to house*" (Interviews 8, 9). RLOs find it very encouraging because "*having a champion in a community that favors [them] over the traditional waste hauling is already a huge help*" (Interview 2). And from individual champions, they hope that eventually, *"households would support their initiatives and donate clean and dry plastic*" (Interview 3). This is possible according to Interview 2. Alon and Araw's main program is youth development through sports, wherein kids are encouraged to bring clean and dry plastic to use their surfboards and other sports equipment for free. From the kids, "*the parents have also started to become involved in our plastic waste management program. The mothers even wash the plastic while they do the laundry*" (Interview 2). "*Even during our coastal clean-ups, the people at the public beach help out too because they feel obligated and motivated seeing kids do the cleaning*" (ibid). Awareness and motivation may be reinforced through community engagement activities such as workshops, seminars, and awareness campaigns conducted by RLOs. But right now, the concept of RL is still in its infancy and requires extensive education and outreach efforts to gain wider acceptance.

The strength of internal processes (*Nurturing*)

Aside from education and information dissemination, **articulating expectations** is crucial for the successful implementation of RL initiatives. RLOs need to clearly communicate the objectives, benefits, and limitations of their plastic waste management programs to both LGUs and HOAs. This includes explaining the financial implications, the importance of community participation, and the long-term environmental impact of diverting plastic waste from landfills. RLOs "*participate in conferences and school events, where [they] are invited to speak*" (Interviews 3, 4), further spreading and articulating their vision to a wider audience.

The drafting of implementing rules and regulations for the Extended Producer Responsibility (EPR) law provides an opportunity for RLOs to contribute their suggestions (Interviews 1, 3). By being consulted during this process, RLOs were able to "*voice [their] concerns and provide insights based on [their] practical experiences*" (Interview 3). According to interview 3, three out of six suggestions made it to the final version of IRR:

1. *Standardized identification and labeling of plastics.*
2. *Develop a harmonized, efficient registry that aids obliged/large enterprises track their plastic neutrality*
3. *Intensify information, education, and communication initiatives for the public.*

The other suggestions that didn't explicitly stipulate in the IRR are:

1. *Creation of an association of waste management enterprises*
2. *Support recycled & upcycled products*
3. *Incentivize existing waste management enterprises that are circular such as infrastructure grants to scale up their operations nationwide.*

The provision in the law to create an association of waste management and RL enterprises can promote collaboration, knowledge sharing, and best practices in the industry. It can provide a platform for RLOs to collectively address challenges, advocate for their interests, and work towards a better waste management system. The benefits of such **social networks and exchanges of ideas and expertise** would allow RLOs to evolve into a mature industry faster. The absence of this platform sometimes results in them "*not being taken seriously"* (Interviews 1, 2) or lack of visibility to the right stakeholders. The statement by Interview 5 somehow reveals

a justification for this need. The LGU officer said that "*[they] don't know any NGO or social enterprise that collects plastic waste [in Bacoor]*." Green Antz has a big plastic collection hub in the city and an innovator, *Gantsilyo* x Handmade[21] (Knit x Handmade), who knits and weaves baskets made of post-consumer plastic bags lives and collects plastics in Bacoor.

This shows that RLOs should ramp up their outreach to leverage their mission and purpose to gain support from various stakeholders. Other RLOs achieve this by joining startup competitions. They join these events for funding and also to create new connections with relevant stakeholders and like-minded organizations. Startup competitions not only allow them to "*showcase [their] solutions but also provide an avenue to reach more organizations to collaborate with*" (Interview 1). RLOs argue that the "*lack of a formal forum for exchanging learnings and best practices*" (Interview 4), only highlights the "*need for such platforms to be established*" (Interview 4). By creating dedicated spaces for knowledge sharing and collaboration, RLOs can overcome the challenges they face and accelerate the growth and impact of their initiatives. A healthy amount of "Nurturing" can provide access to expertise, funding opportunities, and innovation spill-overs. The success of RL initiatives depends on how RLOs improve these internal processes that encompass education, engagement, policy support, and collaboration.

Sustaining gains in reverse logistics through institutionalization (*Empowering*)

Empowering is the last element of the Protective Space that talks about how RL and RLOs become legitimate and competitive alternatives and a significant part of the long-term solution. But from the earlier section, evidence of weak Shielding and Nurturing poses a more aggressive take on **creating institutional reform**. RLOs believe that they can't fight the incumbents in the same arena, with the "*same privileges, level playing field, and same rules*" (Interview 3). In fact, RL should be "*a different industry and not considered as a waste management solution. [It] should be treated as part of the supply chain wherein raw materials are 'mined' from the communities and delivered to manufacturers*" (Interview 3). So much change needs to happen in parallel, RLOs need to rapidly develop a solid business model with satisfying performance while parrying external pressures. Some social innovations may need **radical changes** in the institutional environment to succeed and RLO expressed that is necessary for plastic waste. The

[21] https://www.facebook.com/gantsilyoxhandmade

existing system is deeply entrenched and resistant to change, and RL faces many barriers and challenges that hinder its diffusion and scaling.

In contrast, some regime actors see the same old thing. Some LGUs look for more funding for "*more trucks and bigger landfills*" (Interview 6) so they can provide services to their constituents. According to Interview 6, "*the national government should provide more support to municipalities that don't have capabilities to manage their waste.*" There is also a suggestion for "*more information campaigns, education materials, and workshops*" (Interview 5). Information dissemination is obviously important but so is the message. "*[The LGU will] produce materials that talk about environmental law and ordinances, penalties, how to segregate, segregation at source, etc.*" (Interview 5). Preaching the same thing over and over again might not be enough. It is crucial to tailor the message to the specific needs of the community, the challenges of the changing landscape of plastic waste, and the opportunities for its recovery.

But the Taytay LGU, being the "Garment Capital of the Philippines," has done something different in the past. As a garment manufacturing municipality, they wanted to use "*the trimmings and scraps from factories are collected and stuffed into furniture and toys*. *[The LGU] plans to do the same for [their] plastic waste*" (Interview 7). With the textile waste RL, they tried to institutionalize it through the "*creation of a physical marketplace for recycled products*" (Interview 7). The marketplace served as a platform for buyers and sellers of recycled textile products, supporting the visibility of recycling to the public, and facilitating the economic viability of the RL system.

For HOAs, they see that incentivization as a way to shape peoples' behavior. They suggested that "*it would be nice if companies give incentives to people to encourage them to segregate their waste*" (Interview 8). FMCGs, on the other hand, are more keen "*to incentivize the RLOs that do the heavy lifting*" (10).

The EPR Law is a significant policy instrument that can contribute to the institutionalization of reverse logistics (RL) for plastic waste in the Philippines and in other developing countries. By holding companies accountable for the entire lifecycle of their products, including their

collection, recycling, and proper disposal, the EPR Law creates a strong incentive for communities and companies to adopt RL practices.

The opportunities that EPR presents also come with challenges when it comes to implementation. RLOs suggested that "*separate local legislation*" (Interview 4) on plastic waste recovery and RL is necessary to provide clarity and specific guidelines for stakeholders. "*There should be a point person or a center that can help facilitate and coordinate RL efforts in each locality, ensuring that the processes and practices are effectively implemented and monitored. This coordinating body can help streamline communication and collaboration among various stakeholders*" (Interview 4), especially from RLOs to LGUs, to other regime actors. The coordinating body can help provide access to funding born out of EPR law. A coordinating body "*would allow [FMCGs] to have a point of contact at the local level when [they] do [their] community-based programs [related to EPR]*" (Interview 10). The coordinating body could also initiate capacity-building activities for the successful adoption of RL. RLOs emphasized the need for training programs and technical assistance to enhance the skills and knowledge of individuals and organizations involved in RL. These initiatives can focus on areas such as waste segregation, collection and sorting techniques, recycling technologies, the development of sustainable business models, and other novel relationships.

By implementing separate legislation, establishing coordination mechanisms, providing capacity-building support, offering financial incentives, promoting public awareness, and fostering collaboration, it is possible to empower RL and RLOs as legitimate and competitive alternatives for long-term plastic waste management.

4.3. Shared Vision and Action for Reverse Logistics in Developing Countries

During interviews, several themes emerged, shedding light on the factors influencing the success of RL and RLOs, the role of collaboration between stakeholders, and the importance of a supportive institutional environment. In this section, the paper makes recommendations on how to make RL possible and sustainable, the stakeholders involved, and some ideas to create an enabling environment in the context of a developing country.

Reverse Logistics Organizations (RLOs)

1. Develop a solid business model: RLOs need to rapidly develop a business model that demonstrates satisfying performance and addresses the specific challenges of plastic waste management. The costs of sourcing clean and dry plastic, along with the expenses associated with sorting equipment and manpower along the supply chain (collection, sorting, recycling, and proper disposal processes), contribute to higher prices for their products. Insufficient demand for green products further hampers their financial viability. Addressing these concerns would legitimize RLOs position that a **radical change** to RL is possible and viable while attracting more audience to **articulate their mission**.
2. Advocate for institutional reform: RLOs should actively engage in **advocating for institutional reforms** that promote the adoption of RL practices. This involves pushing for separate local legislation, coordination mechanisms, and specific guidelines for stakeholders.
3. Strengthen capabilities: RLOs should prioritize **capacity-building initiatives**, including training programs and technical assistance, to enhance the skills and knowledge of individuals and organizations involved in RL. This can encompass waste segregation, collection and sorting techniques, recycling technologies, sustainable business models, and other relevant topics. RLOs should also **nurture deeper connections** and leverage the relationships to improve their offerings and open new opportunities.

Local Government Units (LGUs)

4. Embrace RL as a long-term solution: LGUs need to recognize RL as a legitimate and competitive alternative for plastic waste management. They should shift their focus from traditional waste management approaches, such as expanding landfills, to implementing RL practices that promote circular economy principles. This should be supported by policies and programs with clear guidelines to upend the current system and **empower** the RLOs to fill the gaps.
5. Establish coordination mechanisms: LGUs should establish coordination mechanisms that streamline communication and **collaboration** among various stakeholders, including RLOs, FMCGs, and communities. This can be done through the creation of coordinating

bodies or designated point persons responsible for facilitating and monitoring RL efforts in their respective jurisdictions.

6. Promote public awareness: LGUs should **continue information campaigns**, education materials, workshops, and other initiatives to **raise public awareness** about the importance of waste segregation, RL practices, environmental laws, and penalties. LGUs should tailor this message for RL-driven waste management and specific to the community's needs.

Homeowners Associations (HOAs):

7. Encourage behavior change: HOAs can play a role in shaping individuals' behavior towards waste segregation. They can **collaborate** with companies to incentivize residents to segregate their waste through rewards, recognition, or other forms of incentives. HOAs can also organize educational programs and awareness campaigns within their communities to promote responsible waste management practices.
8. Give reverse logistics a try: RL as a plastic waste management scheme may be difficult to follow for some, it could be expensive, and may have pushbacks. But allowing the community to experience RL, or show how it works, would offer a better understanding of its challenges and potential benefits. Also, a champion in the community that will see the initiatives through completion is very crucial. Creating this **favorable environment** would allow RLOs to develop and thrive.

Fast-Moving Consumer Goods Companies (FMCGs):

9. Incentivize RLOs: FMCGs should recognize the efforts of RLOs and provide incentives to encourage their participation in waste management. This can include financial support, collaborations, grants, or contracting RLOs as the service provider for their plastic waste recovery initiatives. **Mobilizing financial resources** in support of RL will alleviate some of RLOs financial burdens and give them the ability to ward off external pressures.
10. Community-based programs: FMCGs should develop community-based programs related to extended producer responsibility (EPR) and RL. They can **establish partnerships** with LGUs and RLOs to implement initiatives that promote responsible consumption, waste reduction, and recycling at the local level.

CONCLUSION

Developing countries face unique challenges in managing plastic waste and Reverse Logistics Organizations (RLOs) can play a crucial role in addressing this issue. Reverse logistics involves collecting and recovering waste from the source to restore value streams, offering a sustainable approach to production and consumption. The Philippines, along with neighboring Southeast Asian nations like Indonesia, Thailand, and Vietnam, are considered as some of the worst plastic polluters in the world. To help understand what it would take to manage plastic waste and make reverse logistics a dominant solution, the author of this paper investigated the benefits and challenges of implementing reverse logistics, examined the success factors for RLOs, and explored the role of regime actors (governments, communities, and companies) in creating an enabling environment or "Protective Space" for the adoption of reverse logistics.

This paper presented the following research questions:

1. What influences the success of RLOs in managing plastic waste in developing countries?
2. How can stakeholders help in the co-creation of enabling environment for RLOs to develop into practical alternatives for plastic waste management in developing countries?
3. What kind of socio-institutional environment supports the adoption of RL for plastic waste in the developing country context, including the role of key change agents/actors?

The study make use of the Protective Space framework suggesting mechanisms to ensure niche innovation like RL emerge, develop, and thrive. This includes (1) shielding the innovation from the pressures of competitive markets, powerful institutions, or entrenched interests; (2) nurturing the innovation to continuously develop through the articulation of expectations, the building of social networks, and knowledge generation and exchanges; and (3) empowering the innovation and actors to undermine the existing regime (Elzen et al., 1996). The Protective Space creates a support system around the innovation, allowing it to develop and adapt to different circumstances without being immediately subject to competition.

The research found that the lack of financial support, limited demand for green products, and high costs associated with sorting and recycling processes pose hurdles for RLOs. While regime

actors express support for plastic waste solutions, there is often a gap between their words and actions due to political dynamics, competing priorities, and limited resources.

To overcome these challenges, Shielding must be put in place. RLOs should seek receptive communities (**favorable locations**) where their initiatives can be implemented with less friction and more tolerance for initial inefficiencies (**exemption to rules and tolerance to poor performance**). Building partnerships with supportive individuals and organizations can catalyze broader acceptance of RLOs and their initiatives. Mobilizing available resources (**mobilizing resources**) alleviates the burden on RLOs and allows them to survive pressures from the incumbent regime. Community engagement activities play a vital role in educating the public about responsible plastic waste management, particularly through workshops, seminars, and awareness campaigns that involve youth and foster a sense of obligation and motivation within communities.

The success of recycling and plastic waste management initiatives relies heavily on the strength of internal processes within RLOs. Effective communication is crucial, and RLOs must clearly articulate the objectives, benefits, and limitations of their initiatives (**articulating mission and expectations**). They can contribute to the development of regulations that align with their goals and advocate for their suggestions, promoting collaboration, knowledge sharing, and best practices in the industry (l**earning mechanism**). Strengthening outreach efforts and establishing strong networks through startup competitions and dedicated spaces for knowledge sharing and collaboration is also important (**social network**).

Empowering RLOs is crucial for the long-term solution of plastic waste management. Reverse logistics (RL) should be treated as a separate industry with dedicated people and dedicated policies (**radical change is needed**). The Extended Producer Responsibility (EPR) Law can serve as a legal basis for this aside from making companies accountable for their products' lifecycle. Many of these challenges may be addressed through legislation, coordination mechanisms, capacity-building support, financial incentives, public awareness, and collaboration but follow-through is also important so gains will not stagnate (**institutional reform is necessary**).

Overall, creating a supportive and enabling environment for RLOs and RL in a developing country, like the Philippines, is in itself challenging. But by combining different approaches, along with the active participation of the regime actors, RLOs can enhance their effectiveness and contribute to a more sustainable waste management system and a healthier environment.

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APPENDICES

Appendix 1. List of Interviews

All interviews were conducted by the author via video call or face-to-face settings. In the analysis, the interviews may have been synthesized, translated, and/or mixed and may not respond directly to the interview guide due to the semi-structured nature of the interview.

Interview 1 - Founder, Republic Junk, Video Call, May 3, 2023.
Interview 2 - Founder, Alon and Araw Club, Video Call, May 4, 2023.
Interview 3 - Executive, Sentinel Upcycling, Video Call, April 16, 2023.
Interview 4 - Hub Administrator, Green Antz Builders, Green Antz Collection Hub, April 27, 2023.
Interview 5 - Environment Officer, Local Government of the City of Bacoor, Bacoor City Hall, April 28, 2023.
Interview 6 - Environment Officer, Local Government of the Municipality of Balayan, Balayan Municipal Hall, April 13, 2023.
Interview 7 - Environment Committee Chairman, Local Government of the Municipality of Taytay, Taytay Municipal Hall, April 17, 2023.
Interview 8 - Committee on Environment and Beautification Director, Mary Homes Subdivision Homeowners Association, HOA Office, April 26, 2023
Interview 9 - President, Addas 2C Subdivision Homeowners Association, HOA Office, May 6, 2023
Interview 10 - Logistics Officer, San Miguel Corporation, Video Call, May 5, 2023

Appendix 2. Interview Guide

Shielding - the processes and instruments protecting innovations from established rules, criteria, or competition.

1. What (pre-)existing resources are provided by regime actors to support recycling/reverse logistics operations?
2. Can you identify a location(s)/area(s) where you have implemented recycling/reverse logistics pilots?
    a. How was it received?
    b. Can you describe the results?
3. Have you been given exemptions or biases in favor of your recycling/reverse logistics operations?
4. Have you been tolerated for the 'poor' economic/technological performance or inconvenience you may have caused concerning recycling/reverse logistics?

Nurturing - the innovation to continuously develop through the articulation of expectations, the creation of social networks and support groups, and knowledge generation and exchange between and among stakeholders *(only for RLOs)*

Articulating and negotiating shared expectations

1. In your opinion, how important is it for RLOs to have a shared understanding of their mission and goals?
2. Are there any formal or informal platforms where RLOs can articulate their expectations, mission, and goals with other system actors?
3. How do you perceive the legitimacy of RL and RLOs in the current waste management system?
4. What challenges do RLOs face when articulating their expectations and goals to system actors, and if so, what are they?
5. Do you believe that RLOs can effectively influence waste management policies and practices in the Philippines? If so, how?

Social network

1. Are there any formal or informal coalitions or networks that RLOs can join to facilitate stakeholder interaction and collaboration? What is it?

    a. Do you believe that system actors, such as local governments, private companies, and communities would be interested in joining a coalition or network with RLOs? Why and how?
2. In your experience, what are the benefits of collaboration and networking between RLOs and system actors in the context of waste management? Provide examples.
3. What challenges do RLOs face when collaborating with system actors?
4. Do you believe that the creation of a social network between RLOs and system actors can contribute to the growth and sustainability of RL in the Philippines?

Learning mechanism

1. How are system actors fostering innovation and experimentation with the RLOs and vice versa, and what mechanisms are in place to support the development of new ideas and practices?
2. Do system actors participate or consult in the knowledge exchange platform used by RLOs, and if so, how?
3. Can you provide an example of a successful partnership between system actors and RLOs in fostering innovation and improving the waste management system?
4. Are there any platforms or mechanisms for RLOs to actively exchange knowledge with each other and ensure best practices are not siloed?
5. In your opinion, what are the key elements a knowledge exchange platform should have to effectively manage waste?
6. Have there been any instances where RLOs and system actors have collaborated to establish new rules or design schemes for waste management? If so, can you describe the process and outcome?
7. In your experience, what role does knowledge exchange play in the growth and sustainability of RL in the Philippines?

Empowering - refers to creating an environment that allows innovators to challenge and influence the current system

1. In your opinion, is your organization competitive under the current waste management procurement criteria? If yes, highlight the performance improvement or undue advantage under current criteria. If not, why not?
2. How do you validate this performance improvement or undue advantage, if any?

3. In your opinion, can the current waste management system and RL co-exist? In what way?
4. As RLOs mature, must the "Shielding" and exemptions be removed? Why or why not?
    a. Do you agree that shielding would result in a significant shift toward sustainable values, and therefore, there is no need to go back to old ways? How?
5. Do you think that nurturing demonstrates a learning process that paves the direction toward sustainability?
6. Can institutional reforms still be achieved with the current rules and policies or are new ones necessary?
    a. Based on your answer, how will the RLOs be the dominant solution with such rules and policies?

Narratives - are shared stories or metaphors that shape how people understand and interact with the world around them

1. What is your understanding of the Philippine plastic waste problem?
2. In your opinion, how should we manage our plastic waste problem? What is your desired outcome?
3. Who are the social actors that can help build that desired outcome?
4. Who are the actors opposing or counteracting the desired future?
5. What activities should be taken to arrive at that desired future?
6. When and where should these take place?
7. What activities do social actors engage in to construct shared narratives toward desired change (narratives of change)?
8. How do shared narratives relate to the popular narratives about this desired change?
    a. Are they conflicting or not?
9. How does technology influence the way that this shared idea of change is created and spread?
10. What role do narratives of change play in social change processes? How do shared ideas of change impact the way that society evolves and transforms?
11. How do groups involved in social innovation use storytelling and these narratives of change to create change? (i.e. change behaviors, make sustainable choices, segregate waste)

12. How do these narratives of change contribute to creating a better society and transforming current systems?

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