Environmental Governance at the Grassroots: Mother Earth Foundation and Ten-Step Program (TSP) Tool for Zero Waste in Context

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Received: 11 December 2024; Revised: 29 September 2025; Accepted: 2 October 2025; Available Online: 18 December 2025

Abstract

Solid wastes, specifically plastics, are considered a serious environmental problem that disrupts ecosystems, making it a common-pool problem for communities. Given the severity of the problem, aside from the government agencies, NGOs are active partners of local government units LGUs in managing solid waste problems. This paper discusses the case of the Mother Earth Foundation (MEF), a community-based NGO that was able to promote zero waste at the grassroots level through the implementation of a Ten-Step Program (TSP) tool.

Methods used are interviews, field observations, and analysis of secondary data. Key informants are the program implementers, and guide questions were provided to them. Field observations include waste collection, segregation, and visits to material recovery facilities. Dayrit's (2022) "A Manual on 10-Step Program", though secondary data within this work, functioned as the core source of information and point of analysis.

Based on MEF's experience in implementing TSP is in promoting zero waste, in the partner communities of San Fernando, Pampanga and the island of Siquijor, Region 8, Central Visayas. Findings show that MEF communities were able to craft their zero waste policies emphasizing "no plastic policy" focusing on waste segregation, reusing, composting, and recycling. More importantly, the TSP is instrumental in institutionalizing zero waste practices in the LGU focusing on valuable waste as common-pool resource. Through sustainable implementation of the TSP, waste was properly managed, waste workers were empowered and recognized in the LGUs and diversion rate from the landfill was realized. In conclusion, the zero waste is a grassroot tool linking local government, non-government organizations, and community members in managing the common pool issue of solid waste.

Keywords: Environmental Governance, Grassroots Governance, Mother Earth Foundation's Ten-Step Program, Solid Waste and Zero-Waste, Common Pool Resources

Introduction

The global problem of plastic wastes bloated due to the commodification of nature. Population increase, rapid urbanization, a booming economy, and a high standard of living in developing countries have significantly accelerated the rate and volume of waste generated (Minghua et al., 2009). According to Jambeck et al. (2015) the Philippines is one of the countries in Southeast Asia with high waste collection and third among the world's largest sources of marine plastic litter. Waste problems in the Philippines are the result of various factors, including the increasing volume of garbage and improper implementation of the Ecological Solid Waste Management Law (RA 9003). According to a study conducted by the World Wildlife Fund (2020), Filipinos' annual consumption of plastic packaging is approximately 20 kilograms, with 15.43 kilograms of this amount becoming waste. These studies on plastic waste are alarming, considering that plastics move around transboundary resources. Furthermore, research also reports that marine life ingests solid waste littered in the oceans of the Eastern Visayas, Philippines (Cabansag et al., 2021). According to the study (Cabansag et al., 2021), out of the 70 collected and dissected specimens, 41 rabbitfish were positive of microplastics, while the 21 mullets had marine plastics.

The severity of plastic dumping is not only the responsibility of the government. Households have strategic responsibilities. Their position as a point of consumption and waste generation creates opportunities for better waste management. However, despite the 2000 law on Ecological Solid Waste Management (ESWM), not all households are practicing source segregation. In a study conducted by Castilla et al. (2024), residents are generally aware of proper waste disposal; however, a gap exists between their attitudes and actual practices. Multi-stakeholder participation is needed for a more efficient implementation of ESWM. The waste management ecosystem comprises many stakeholders; therefore, these stakeholders should also be responsible for diverting waste from landfills.

The objective of this paper is to analyze and conceptualize the TSP tool developed by the Mother Earth Foundation (Dayrit, 2022) as an articulation of environmental governance at the grassroots level. The grassroots level in this paper refers to the barangay, the smallest unit in the Philippines' local government system. Similarly, the study is significant as it presents a holistic approach to working with communities to better implement the ESWM law (RA 9003), which is participatory and systems-based, with the goal of achieving zero waste. By analyzing the case of Mother Earth Foundation's (MEF) TSP through the lens of Ostrom's common pool resources, this paper develops a model that views waste as a common pool problem, but one that can be addressed through a common pool solution, such as the Materials Recovery Facility. Relating this link between problem to solution is the grassroots approach of zero waste.

Environmental Governance

Environmental governance encompasses the rules, practices, policies, and institutions that shape human interactions with the environment. It acts as a bridging concept between law, political science, environmental sciences, management theory, and sociology" (Sandhu, 2021). It covers the roles of actors, including the government, NGOs, the private sector, and civil society, in managing common-pool resources. Thus, managing solid waste problems as complex issues falls under the purview of environmental governance.

Solid waste problems require interdisciplinary solutions that extend beyond the realm of environmental law and regulations. It requires multidisciplinary actors who are familiar with community experiences, actors who have worked in empowering communities, and are accustomed to grassroots-based approaches. One such solution is the zero-waste approach, a method for treating rubbish that prioritizes valueless materials for disposal, while retaining those that can be composted, reused, recycled, or traded for further use (Zaman, 2023). Zero-waste practices, facilitated through their segregation scheme, contribute to a circular economy where resources cycle rather than being exhausted at the end of production and consumption in a linear manner (Velvizhi et al., 2020). Among actors, NGOs are diverse groups that are immersed in various humanitarian and environmental issues. They played a crucial role in raising environmental awareness and strengthening communities' understanding of these issues. They also facilitate in linking government units with private citizens to achieve pro-environmental action (Castillo, 2020).

Literature Review

Solid Waste and Resource Management

Though materials that people dispose of as trash into the waste stream harm the ecosystem, some have the potential to be recovered as recoverable resources. Šyc et al. (2020) found traces of valuable metals and glass in the resulting bottom ash from waste incineration, which could have been and may yet undergo recovery. Findings by Ddiba et al. (2022) suggest that composting and the use of organic solid waste as biogas can generate a range

of revenues, ranging from $5 to $40 million USD. After conducting a cluster analysis of various cities around the globe, Koop et al. (2022) posited seven principles on local governance of waste with a common idea of waste as a community resource. In comparison, Bui et al. (2022) laid out that a successful circular economy of waste mandates social as well as local government cooperation.

Materials Recovery Facilities are also undergoing continued research for better management of resources and residuals. Studies such as that of Herrera et al. (2024) continued to look into the potential of these facilities in recovering resources. Their chemical analysis espoused the potential for Materials Recovery facilities to produce residual pulp to create paper and laminated sheets. Other studies looked into the sorting process. Antonopoulos et al. (2021) state that plastic impurities complicate the recovery process and thus suggested packaging reviews at the production stage. Kyriacou et al. (2021) experimented with artificial intelligence and machine learning algorithms in a Materials Recovery Facility simulation and found that such models are not better than real-life human waste sorters. To discuss resource management further, the Ten-Step Program (TSP) according to Dayrit, (2022), serves as a guide to waste managers in promoting zero-waste where the material recovery facility acts as an enabler for waste diversion from the landfill.

Solid Waste and Grassroots Governance

Contemporary literature suggests variations in grassroots governance for managing solid waste. Using a qualitative comparative method on best- and low-performing villages in solid waste management, Castillo (2020) identified four key findings that emphasized a working set of networks linking solid waste management at the grassroots to official and non-official agents, both within and outside the village's socio-political space. Based on data from case studies in Africa and Latin America, Campos et al. (2020) argued that mobilized networks of the urban poor can generate social resources that can match the capacities of those in the upper economic classes. Such resources are social technologies that utilize local knowledge and foster inclusive social linkages, aiming to better manage solid waste in their communities. Two other case studies, one in Argentina and one in Brazil, provided evidence for Gutberlet et al. (2021) to highlight the importance of empowering waste pickers, educating them, and promoting stewardship in reducing landfill abuse and maximizing resource recovery from solid waste. Celestin and Dorcas (2024) surveyed award-winning entrepreneurs on environmental and development issues, linking the dual traits of pro-environmental behavior and educational preparation to a functional, sustainable identity for small and medium-scale enterprises. Lastly, Acheson et al. (2024) took a truly innovative perspective by drawing on feminist theory, arguing that intersectionality serves as a framework for addressing the diverse social concerns among community members. Communities encompass a range of differing genders, as well as variations in economic capacities and differences in race and religion. Failing to understand these differences can result in policies that leave others behind in sustainability efforts.

These studies highlight the ongoing need to enhance solid waste management at the earliest stage of the waste cycle. Scientific technology, Global North Solutions, and top-down perspectives may not be enough for a problem that's already on the streets. A grassroots approach, empowering local government units as well as community members, helps enforce segregation at source and stem the tide of waste proliferation. This research thus explores grassroots approaches to addressing the situation by examining the case of the Mother Earth Foundation's 10-Step Program in the Philippine context.

Framework

Theoretically, the study employed Elinor Ostrom's (2008) framework of common-pool resources to conceptualize the TSP tool, which addresses the common-pool problem of solid waste. Common-pool resources, as used in this study, refer to the resource environment or domain characterized by an open-access problem. Managing common-pool resources is a challenging task. A recent review article summarizes the following challenges to the management of common-pool resources: environmental, socio-economic, and governmental (Tucker et al., 2023). The concept of common-pool resources aims to address limited resources while proposing a norm that prevents a community from depleting the resource. As communities grow in size, it becomes difficult to organize them into a set of practices (Andersson et al., 2021). However, this can be achieved through a network of interconnected agents working together within a community.

Though waste can be a common-pool problem, this study also considers it as a common-pool resource. It is a valuable resource, when reused or recycled, that can be managed to produce sustainable benefits for a range of actors, such as waste workers. Part of waste as a resource management strategy is the material recovery facility, which segregates valuable waste from non-valuable waste. Ostrom described common-pool resources in 1990 as community resources that either originate from nature or are the result of human innovation (van Klingeren & de Graaf, 2021). These resources, if mismanaged, can quickly become depleted. A system of managing such resources is founded on a certain degree of mutual trust among members. This theory argues that there is a third path beyond the dichotomy of state and private management of resources (Herzberg, 2020). The third way is through formalized self-governance or community organization. The community organization is being refined by an NGO that acts as an intermediary.

It is in this context that MEF, through the TSP, intervenes in the management of valuable waste as a common-pool resource that links government units and private citizens. The program consists of ten steps, including an awareness campaign on the existing law regarding ecological waste management, capacity building of the partner community through a series of training sessions on household waste segregation, segregated collection, and the establishment of a material recovery facility as an enabler. Valuable wastes that can be reused and recycled are a common problem; thus, a holistic scheme must be applied to properly channel waste into a useful form, as is being done in community material recovery facilities. The TSP employs a bottom-up approach, and the active participation of community members, monitored by MEF, is key to successful waste management.

Managing common-pool resources is a challenging task. A recent review article summarizes the following challenges to the management of common-pool resources: environmental, socio-economic, and governmental (Tucker et al., 2023). The concept of common-pool resources aims to address limited resources while proposing a norm that prevents a community from depleting the resource. As communities grow in size, it becomes difficult to organize them into a set of practices (Andersson et al., 2021). However, this can be achieved through a network of interconnected agents working together within a community. A variation of such an approach is in a study on common water resources used in aquaculture and in fisheries, which found that co-enforcement can help generate benefits in communities that make use of common pool resources; however, the practice of monitoring can be a liability against any revenues gained (Chávez et al., 2021). Another similar study affirmed the significant characteristic of democratic communities since coalitions help offset any losses from the efforts made through monitoring (Chávez et al., 2023). Furthermore, positive reinforcement is most effective among democratically

governed groups (DeCaro et al., 2021). Lastly, according to DeCaro et al. (2021), negative reinforcement can cause problems rather than yield results unless the group is democratically governed.

Adapting this theory, this paper argues a common pool problem and solution paradigm. This has two sides. First, waste is a common-pool problem within a community. An individual's consumption does not generate rubbish that remains within a private space; rather, it pollutes the community. Second, the Materials Recovery Facility is a common-pool resource. This is not a device that operates through the efforts of one assigned community member but rather requires the participation of each household. Both problem and solution meet through the bridge of a grassroots approach.

Materials and Methods

The paper employed a descriptive, qualitative research design using a case study approach. As a case study, the paper conceptualizes TSP as a common-pool resource based on Ostrom's theory. The results and analysis describe community dynamics between private and government units at the grassroots levels in addressing solid waste.

The unit of analysis is locations where MEF, as a community-based NGO, has documented success in promoting zero-waste practices. The MEF was organized in 2000 and is being sustained by projects funded by various LGUs, sectoral groups, advocacy organizations, and schools. The organization is a member of the ECOWASTE Coalition in the Philippines. MEF is an NGO working with communities on ecological solid waste management in various capacities. It is a non-stock, non-profit organization actively addressing waste and toxic pollution, climate change, and other health and environmental justice issues. It has been working with communities from the smallest political unit to the provincial level. MEF was established in the Philippines in September 1998 by 15 environmental advocates who sought to promote proper waste management and environmental protection within the community. More than 25 years later, MEF has enabled local governments and NGOs to implement Zero-Waste programs. Thus far, MEF has worked with several urban cities, municipalities, barangays (villages), and provinces. It is also instrumental in working with international NGOs on Zero-Waste models. The activities of MEF began with IEC projects, which facilitated awareness programs and training on ecological waste management. The sample sites from which the MEF projects have been documented included the Pampanga Province (City of San Fernando) in the North and Siquijor Province in the South of the Philippines.

Interviews and observations were mainly used as methods of gathering data. An interview with MEF project leaders and MEF board members offers an in-depth expert perspective on how the TSP was implemented in the communities. Four MEF project leaders, two staff members, and two board members were interviewed based on their expertise in waste assessment and brand audits (WABA). On the other hand, through observation, actual segregation at source during WABA was documented in its natural setting. The Key informants were given guide questions on how they implemented zero-waste practices in communities, from the time they entered the community until they left, and how they transitioned these practices to community members. Observations were conducted through activity-based documentation, including IEC activities with community members, a house-to-house campaign on waste segregation, and the establishment of a material recovery facility in the community. A review of the manual on the 10-step program of MEF (Dayrit, 2022) facilitated understanding of the various phases involved in implementing the TSP.

This research did not study vulnerable participants; rather, the data originated from interviews with expert informants. The researchers provided complete information, ensuring informed consent was obtained during each interview. The manuscript does not mention the interviewees' details and identifying information. Any results, discussions, or related narratives use code names to protect the interviewee participants' right to privacy. A review of the MEF published materials was also used to augment the data needs.

The research employed three modes of data gathering, including interviews, observations, and a review of literature and documents. Thus, data analysis was conducted through the triangulation of these data acquisition modes. The researchers used the following themes as open codes, drawn from triangulation, which include TSP as a Zero Waste Framework, Process, and Tool. These codes then underwent two levels of validation: 1) peer debriefing, and 2) member checking to ensure that the concepts coincide with theory and reality. Through peer debriefing, the researchers consulted with peers and mentors at the research center. Member checking involved returning to the interviewed members.

Results

The TSP adopted the Ten-Step Program of Dayrit (2022), which enables environmental governance at the grassroots level. The household waste, as a problem that underwent the TSP through the material recovery facility, has been converted into a common-pool resource. Furthermore, the TSP has evolved into three functions: framework, process, and tool.

A. The TSP as a Framework

The ultimate goal of the TSP tool is to implement Zero Waste at the grassroots level. The whole TSP could serve as a framework for crafting a zero-waste community. It is a holistic approach to managing valuable waste as a common pool resource. The TSP program is divided into several steps or activities that require community involvement, as observed in the communities of San Fernando, Pampanga. As a system approach management tool, the MEF waste facilitators observed that stakeholder engagement has been very active through the process. TSP is a phase-based approach to waste recovery, initially strengthening awareness among waste workers, recognizing that waste can be transformed into a common-pool resource. The TSP, interwoven with a legal framework, engineering work, and economic opportunities, is a system approach where a problem has been translated into a resource as part of grassroots governance.

B. The TSP as Zero Waste Process

The TSP as a process is heavily dependent on stakeholder engagement. The TSP tool must be approved by the local officials to be participated in by the community members as guided by MEF staff. It consists of ten steps (Dayrit, 2022), including green profiling, awareness, formation of a committee, application of segregation at source, inclusive segregated collection of waste using a small vehicle for collection, which will serve households residing even in narrow alleys.

Environmental Profiling

The purpose of profiling is to familiarize the community landscape. Entry in the community is very crucial, especially if the gatekeepers are not properly informed. Gatekeepers are the elders or local leaders in the community. Both in Siquijor Island and San Fernando, Pampanga, political officials serve as gatekeepers, and approval for profiling is top-down. Composed of barangay leaders and households, a baseline survey is carried out in every household to assess Awareness, Perception, and Practices (APP). Then, additionally, the Waste

Assessment and Brand Audit (WABA) is conducted. This is important because branding determines which popular brands are consumed by the communities.

Enabling Awareness

Awareness is a critical phase in the TSP process. It provides training for various sectors in the community. The significance of awareness lies in enabling the community to understand the existing laws on waste management, as not all national laws are effectively implemented at the grassroots level. These trainings are focused on the major components of Republic Act 9003, also known as the Ecological Solid Waste Management Act of 2000 (Congress of the Philippines, Republic of the Philippines, 2001). The objective of the multi-sectoral training and consultation is to enhance familiarity with the legal framework of solid waste management.

The Ecological Solid Waste Management (ESWM) Committee

Awareness activity is followed by the creation of the decentralized ESWM Committee, from various sectors such as youth, women, and local businesses. This committee allows stakeholders to participate in decision-making and planning, ensuring the waste management system is tailored to their community's needs.

Segregated Collection Scheme

The pushcart has been an important vehicle in the collection of segregated household waste, ensuring that waste in narrow streets is collected. Another important component of the collection scheme is adherence to the "no segregation, no collection" policy by each household. As mentioned by a waste worker from Siquijor, initially, there is little difficulty with the collection schedule, as community members are not accustomed to segregation. However, through persistent practice led by the barangay, the policy on segregated collection has reduced the disposal of waste. The researchers observed that since waste bins are separated, the stench of garbage is reduced.

Translating the Waste Problem to Waste Recovery in the Materials Recovery Facility (MRF)

An MRF, or Materials Recovery Facility, is the very essence of zero-waste practices. The MRF has segregated areas for different types of waste. An MRF has designated areas for recyclables, a compost heap, a containment area for residuals, an organic garden, a collection vehicle, a perimeter fence, and clearly labeled bins. The MRF is managed by local waste workers, where further segregation occurs. Efficient management of MRF means additional livelihood and income for waste workers. This structure in environmental management encourages community participation as households follow the policy to segregate their waste, which the waste collectors will then collect. As observed by waste workers and community members in San Fernando, Pampanga, and Siquijor, since the collected garbage has been previously segregated, processing is easier at the MRF, which requires further sorting or cleaning.

Enhancing Waste as a Resource Through Information, Education, and Communication (IEC) Campaign

The IEC campaign is a crucial component of the tool. The MEF project team, together with MEF Board members, conducts an IEC session for local residents, equipped with IEC materials on waste segregation practices. This brings environmental knowledge or literacy from NGOs into the grassroots community. According to the interviews with the women participants in San Fernando, Pampanga, a document was signed confirming receipt of the IEC materials and compliance with the waste segregation guidelines.

Application, Evaluation, and Improvement

With the collection system through segregated collection of the pushcarts and the material recovery facility in place, the initial collection from the household is to be observed. The segregation at source and segregated collection is monitored and documented by the waste workers and MEF staff. If segregation at source is followed,

adjustments have to be made before the full implementation of the ESWM program. The actual implementation has to consider the cultural practices of the households. The application and evaluation are also critical phases as they define how the community accepts the various steps in the TSP. This allows the community members to be flexible in the various steps taught to them. Community members can volunteer or identify their fellows with particular strengths regarding any of the processes, such as collection, monitoring, and evaluation (MEF Project Leader, interviewed).

C. The TSP as a Zero Waste Tool for Environmental Governance

Monitoring and Enforcement of Penal Provisions of the Ordinance

Monitoring of the various phases of ESWM is an essential component of the tool. Even if the collection and MRF are in place, if this tool is not closely monitored, then it will not be sustainable. Monitoring is a proactive approach that not only ensures compliance but also contributes to refining the entire waste management system, thereby enabling stakeholders to address their waste management challenges effectively (MEF Project Leader, interviewed). Monitoring the ESWM program is a continuous process that covers all phases. Continuous monitoring is integral to the proper maintenance, sustainability, and improvement of the TSP. Monitoring the ESWM program requires regular documentation and evaluation of its progress.

According to an MEF Board member, once the dry run has been successful, the next step is the full implementation of the Barangay ESWM. In the cases of San Fernando, Pampanga, and Siquijor Island, officials and their waste workers impose penalties on those who do not segregate their waste at the source. Collectors do not accept unsegregated waste and issue tickets to households that fail to comply. Full implementation means that all the steps have been accomplished from waste segregation at source, collection of segregated waste, collection according to schedule, and then temporary storage at the MRF before final dumping. The final output of the TSP is an ordinance on "no plastic policy" as practiced in the two zero-waste model local government units, San Fernando, Pampanga, and Siquijor Island in Region 8, Central Visayas.

Discussion

Based on the findings, the paper presents a common pool problem and solution paradigm. The paradigm (see Figure 1) treats solid waste (left rectangle) as a form of common-pool problem (left circle), not just by an individual, one household, or the local government. Instead, it is a problem that can affect the community. This necessitates a solution that involves community participation. The Materials Recovery Facility (right rectangle) is not just a campaign of Mother Earth Foundation; it is part of the mandate of the Philippine Ecological Solid Waste Management Act of 2000. The Materials Recovery Facility, in this case, is a form of a common-pool solution (right circle). The common pool problem and common pool resource are the same shape and size, but occupy the left and right sides of the paradigm to illustrate that they are two sides of the same coin, both with the responsibility of the community. Solid waste and the Materials Recovery Facility serve as the case sample in this research. Both of them are in similar rectangles and the same size, with the difference that they are located on the left and right sides of the paradigm and are aligned, respectively, as a common pool problem and a common pool solution. The grassroots approach bridges these two within the paradigm, much like an equation. Local government can help the community, as can non-government organizations (in this case, MEF). However, community concern requires a solution that is empowered by the community. Lastly, the cyclical arrows at the edges of the paradigm illustrate how segregation contributes to a circular flow of resources akin to a circular economy (Velvizhi et al., 2020).

The essence of zero waste is not that there is no rubbish, but rather that waste has been minimized to zero. Tying this up with Ostrom, the materials that could've gone to waste could instead be a common-pool resource.

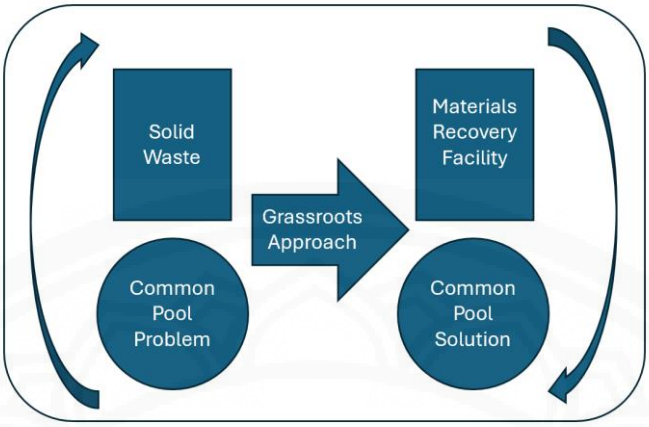

Figure 1 Paradigm Applying Ostrom's Idea of Common Pool Resources as a Grassroots Common Pool Solution and Problem Approach.

The TSP is a community-based, common-pool resource management system that links NGOs, grassroots organizations, and local governments. Using Ostrom's definition, the TSP can be considered as a human innovation shared pool resource (van Klingeren & de Graaf, 2021). It establishes an interlinked community working together to address segregation at its source, allowing a refined set of materials to flow into the Material Recovery Facility. Human cooperation as a resource linked to the process of waste segregation builds upon self-governance at the grassroots level. Producers can be at fault for the packaging process that adds to the generation of waste (Antonopoulos et al., 2021), however, consumers need not add to the problem through proper disposal and segregation. The TSP educates community members and sets up mechanisms for correction as violations occur. A functioning community that cooperates in a no-segregation, no-collection policy reduces the sorting problems in the Materials Recovery Facilities and the Compactor Facilities, as reported by Antonopoulos et al. (2021) in the literature. The same holds regarding the recovery of potentially valuable resources that can be used for recycling and selling (Koop et al., 2022; Šyc et al., 2020) and thus add to the revenue of the community (Chávez et al., 2021). Grassroots cooperation within the TSP also reflects the literature on common-pool resources as a proposed norm (Tucker et al., 2023). However, rather than managing resource consumption as is the norm, this particular case draws resources from waste that would have otherwise contributed to environmental degradation.

Local knowledge becomes a component of the TSP as NGO members work with local community members to complete the steps of Formulating Systems and a Collection Schedule. This process of empowerment at the grassroots level is what Campos et al. (2020) describe as a capacity-building that elevates resources from the bottom to match those at the top. The process is also aligned with the principle of segregation at source, which addresses the issue of complex mixed substances in the waste stream. Collection systems and collection schedules informed through community profiling also reveal the possibility of intersectional clashes, a problem highlighted by Acheson et al. (2024), which can disrupt planning and execution due to differences in gender, economic capacity, or cultural backgrounds. This can also help in surmounting Tucker et al.'s (2023) layered challenges to common-pool resources management, encompassing environmental, socio-economic, and governmental aspects.

MEF's approach of tying NGOs with the local village government and even the office of the local municipality government formalizes the community organization. It legitimizes initiatives on solid waste management. The data support the notion that the TSP is an example of (Herzberg, 2020), the third way of managing common-pool resources, which involves NGO agents occupying a socio-political space between the private and public sectors. This linkage encourages the household to cooperate with the local village policies and transforms the policies into behavioral norms through family cooperation. The dynamic of families preparing their garbage as separate materials ready for collection can become a habit that is passed down from one generation to the next.

The position of the household as a private entity implies a lesser mastery of technicalities, particularly in policies that address scientific aspects, such as differences in garbage composition and proper waste handling. Not even AI can best humans in sorting solid waste (Antonopoulos et al., 2021). Problems in the management of residuals can occur if there are issues in sorting the source materials (Antonopoulos et al., 2021). NGO and community technical sharing best addresses this. The TSPs, a) Complete Information, Education, and Communication (IEC) Campaign, and b) Technical Assistance in Materials Recovery Facility (MRF) Operations, supplement the community with specialized knowledge so that the community learns proper waste handling and how to optimize the use of its MRF. The MEF's team also provided training to waste pickers, helping to elevate their knowledge of waste segregation and develop social skills to encourage cooperation from households. The phenomenon affirms findings from related literature, such as those of Celestin and Dorcas (2024) and Gutberlet et al. (2021), which recognized enhanced waste picker/collector and community knowledge as assets in sustainable practices.

Lastly, the TSP's monitoring and Enforcement of the Penal Provisions of the Ordinance can benefit from Acheson et al. (2024), which explores different perspectives on gender, race, economic class, and the possible intersections of these differences among community members, as well as behavioral tendencies that lead to violations and avenues for correction. The TSP, however, aligns with the principle of democratic governance in common-pool resource management. As explained by DeCaro et al. (2021), community participation in community policymaking, as evident through household-NGO-local government linkages, opens the space for democratic discourse and alleviates any problems caused by the irritations or inconveniences resulting from negative reinforcement.

Conclusions and Suggestions

Collaboration, partnership, and sustainability are the key goals of MEF in achieving zero waste. In doing so, solid waste management can be accomplished at the grassroots level, linking household members with the LGUs. The TSP, as a tool, is innovative in implementing variants of MRFs using local materials in the area, scheduling systems, and routing schemes tailored to the uniqueness of the LGU's landscape and cultural practices. It is also an avenue where community members' voices are heard, empowering them to engage in waste segregation, reuse, composting, and recycling. These characteristics contribute to the TSP as a means of shaping the community into an organic, common pool of resources that addresses waste through maximized recovery and minimized residuals at the grassroots level.

TSP as a vehicle for a zero-waste model is recommended as an essential part of environmental governance at the grassroots level. Thematically, the model is presented as a framework, process, and tool. It is a framework that draws on resource recovery and waste diversion from landfills. As a process, it involves stakeholder

engagements in working together on how waste, as a common pool problem, can be translated into a common pool resource through the material recovery facility. It is a tool, as the TSP provides a phase-based step that is collaborative for all sectors of society, strengthening grassroots governance of a problem within one's own community. Based on these, policy recommendations suggest that local villages and municipalities can open doors for public-private partnerships with NGOs to explore a TSP for their respective communities. Within the Philippines, this endeavor can align local government programs with Republic Act 9003, otherwise known as the Ecological Solid Waste Act of 2000, as legislated by the Philippine Congress.

Regarding future research, quantitative studies can conceptualize and measure effects comparatively with locations that have not implemented the TSP. International studies can also compare and contrast localized initiatives in Southeast Asia, such as those in Indonesia, Malaysia, and Thailand, where like-minded NGOs have conducted similar advocacies on solid waste management. This research incorporates a blended artistic and scientific interpretation of grassroots participation modes, as the case study conceptualizes TSP as a common-pool resource management, where common-pool problems meet common-pool solutions. While conceptualization included artful interpretation of themes, the study also balanced this with the scientific process through validation. The research, however, is not a study on success but a study on process; thus, the manuscript relies on the assumption of previously documented successes by MEF. Further research can thus be conducted on the strengths and weaknesses of MEF's 10-Step Approach towards policy accommodation and its potential for export to other countries.

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