



TOWARDS SUSTAINABLE PLASTIC WASTE MANAGEMENT IN SRI LANKA: LESSONS FROM RWANDA FOR ADDRESSING POST-CONSUMER PLASTIC PACKAGING

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ABSTRACT

The proliferation of post-consumer plastic packaging (P.C.P.P.) waste in Sri Lanka has escalated into a pressing environmental, economic, and social concern. This article examines the current practices and regulatory gaps in plastic waste management, focusing on the responsibilities of manufacturers, distributors, and consumers. Drawing on global practices and local challenges, the study highlights the critical need for comprehensive legal frameworks to enforce Extended Producer Responsibility (EPR), improve recycling systems, and curb the unsustainable life cycle of plastic packaging. The research employed a qualitative doctrinal methodology, analysing laws, regulations, policies, and literature through descriptive comparative analysis. Recommendations emphasize the role of policy, regulation, and infrastructure in fostering a circular economy.

KEYWORDS: *Plastic Waste Management, Plastic Pollution, Plastic Packaging Waste, Producer Responsibility*

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1. INTRODUCTION

1.1 Background of the study

This research examines how the laws regulating plastic packaging waste in Sri Lanka can be strengthened by drawing on laws and regulations from the Rwandan Jurisdiction. By identifying Rwanda's regulatory framework for managing plastic packaging waste, Sri Lanka can explore new avenues for effective and efficient implementation of law reforms on plastic packaging waste management.

Rwanda is a country in the central region of Africa covering roughly 25,000 square kilometres of land with a population estimated at 9 million people in the year 2006 (UNDP, 2008). However, the context of the political, social, and economic system in Rwanda is profoundly linked with the civil war and genocide of the early 1990s (UNDP, 2008). Rwanda has undergone some major economic transformations in urbanisation and industrialisation, which are fast developing (UNDP, 2008). Thus, this rapid transformation is set to be the fastest, specifically in the city of Kigali (Manirakiza et al., 2019).

Rwanda is undergoing a major economic transformation as urbanisation and industrialization expand rapidly, especially in the City of Kigali (Manirakiza et al., 2019). On the other hand, questions about sustainable waste management systems remain overshadowed as Rwanda's rural communities face the challenge of waste. However, Rwanda is the only African country that has partly solved the plastic waste problem by strictly banning plastic bags nationwide (Kehinde, 2020).

Plastic Packaging is vital to protect the product inside during the storage and transportation of the product to the Consumer. Manufacturers tend to look for a suitable economically beneficial option concerning its practical usefulness and market attraction. Once the product is consumed, it becomes a waste-making burden and additional expenses on the consumer and the environment with its disposal.

In Sri Lanka, due to rapid urbanization and population expansion, the demand for plastic packaging has increased, which has led to a sharp rise

in post-consumer plastic packaging (P.C.P.P.) waste. Although there have been some initiatives to collect and recycle waste, the nation still confronts several obstacles, such as poor infrastructure, poor segregation techniques, and a lack of laws to hold producers responsible for the packaging's end-of-life handling.

Sri Lanka heavily relies on open dumping and landfilling, which exacerbates environmental deterioration, even though international standards emphasize a circular economy and sustainable waste management (Balachandra & Abeysekara, 2024). Mismanaged plastic waste puts human health, biodiversity, and important sectors like tourism and fishing at risk by contributing to land and marine contamination. As a result, long-term health and ecological effects of micro plastics that have alarmingly found their way into food systems from plastic waste.

Sri Lanka has taken steps to address these problems, including enacting the National Waste Management Policy (Ministry of Environment, 2019) and outlawing several single-use plastic products. However, progress has been hindered by enforceability gaps and the lack of strong Extended Producer Responsibility (EPR) frameworks. To mitigate the plastic catastrophe, legal measures that monitor and control plastic manufacturing, use, and waste management must be strengthened. To prevent and reduce plastic packaging waste in Sri Lanka, comprehensive measures are urgently needed. The study highlights the importance of collaborative effort and legal reforms for sustainable development.

1.2 Literature Review

Legal and Policy Framework for Plastic Packaging Waste Management

Existing Laws, Regulations and Policies in Sri Lanka

In Sri Lanka, the plastic waste management is governed by the key statute rather than legislation specific to plastic packaging waste, the National Environmental Act No. 47 of 1980 as amended. The act empowers the Central Environmental Authority

to monitor and enforce the laws on environmental protection and the waste management. Under the NEA 1980, regulations have been promulgated on solid waste management and the control of polythene and plastic (CEA, 2020).

In 2008, the manufacture and sale of polythene products of 20 microns or less in thickness were introduced through the Extraordinary Gazette No.1534/18. The restrictions are targeted on single-use polythene bags rather than different categories of plastic packaging waste (Ministry of Environment, 2018).

Sri Lanka banned importation of certain plastic materials including sachets, plastic cutlery and polythene to decrease the plastic pollution. (Department of Import and Export Control, 2020). Hence, the measures do not imply a comprehensive legal framework for the management of plastic packaging waste within its lifecycle. Provincial councils under 13th amendment to the constitution' is not a sentence.

What do you refer to by the term “those These regulations created inconsistencies in enforcement and compliance (Gunasekara, 2019).

The National Solid Waste Management strategy (2007) stipulated broad guidelines for waste reduction, recycling and environmentally sound disposal mechanisms. In 2019, the National Policy on waste management identified the challenges of plastic waste and EPR and public awareness (Ministry of Mahaweli Development and Environment, 2019).

Even though the policies have identified EPR mechanisms, their practical implementation remains weak, as the necessary legislative enactment has not been enforced yet. Measures are still at the discussion level for the implementation of legal regulations by adopting the EPR concept for plastic waste management (CEA, 2022).

Legal and Policy Framework in Rwanda

Article 22 of the Constitution of the Republic of Rwanda 2003, as amended in 2015, states: "Everyone has the right to live in a clean and healthy environment." The Rwandan Ministry of Environment has revealed that plastic bags are linked to environmental pollution, such as water pollution and the death of aquatic animals etc. (Pritish, 2019). Environmental protection is a key priority for the Rwandan government, as emphasized in this paper. The Rwandan government has implemented a series of measures to manage plastic waste and promote environmental sustainability.

Article 23 of the National Constitution of Rwanda, originally enacted in 2003 and amended in 2015, guarantees everyone the right to live in a clean and healthy environment. Further, as per the Article 53 of the amended constitution, “everyone has the duty to protect, safeguard and promote the environment, that the State should ensure the protection of the environment, and do so by means of a law that determines the modalities for the protecting, conserving and promoting the environment” (Lower, 2020). The Rwandan government has taken several measures to manage plastic waste in response to its identification of the impacts on the environment and human health. (Hakuzimana, 2021).

Since the early 2000s, Rwanda has taken proactive measures in addressing environmental issues, including plastic pollution. The Rwandan Ministry of Environment decided in 2003 to initiate a national discussion to deal with the use of plastic bags across the country. The discussion was to implement a ban on the manufacturing, production, and importation of plastic bags, as well as the pronouncement of a one-year penalty, fines, or imprisonment for the offenders. Further, the Environmental Ministry decided to implement a strict ban on plastic bags that was extended across all communities in Rwanda (Ruwanda Vision, 2020).

However, in 2004, the discussions were drafted, passed into law and announced to be implemented the following year. Then, in 2005, the Rwandan

government announced a ban on the production, import, export and use of plastics less than 100 microns thick (Pritish, 2019). The country has implemented stringent regulations banning single-use plastic bags, even prohibiting travellers from bringing plastic bags into the country. (Nyathi, & Togo, 2020).



Figure 1 Source: Dsilva, E. (2019) ‘Going surgical on plastics in Rwanda’, *Down To Earth*, 24 December

The implementation of these policies has been carried out through education and awareness campaigns to promote the use of alternatives, such as biodegradable plastics, for all citizens. However, these policies have affected the operations of plastic bag manufacturers/manufacturers in Rwanda (Kehinde, 2020).

Law No.57/2008

The initial attempt to prohibit plastic bags was implemented through the Prohibition of Manufacturing, Importation, Use and Sale of Polythene bags in Rwanda, Law No 57/2008 of 10 September 2008. The law banned the manufacture, importation, use, and sale of non-biodegradable polythene (polyurethane) bags. This legislation built upon a 2004 government directive that had already prohibited the importation and production of such bags, expanding the focus to include their use by residents and businesses (Uche, 2023). Although the law was repealed in 2019, research indicates it significantly reduced plastic bag usage and improved recycling rates, with claims of 70–80% of plastics being recycled (Dsilva, 2019). It is emphasized that the rule also resulted in lower pollution levels in water treatment facilities and lower expenses

associated with cleaning up (Dsilva, 2019). Further, the decrease in plastic pollution has lessened the soil micro plastic level, which could have improved the health of Rwanda's cattle and people (Dsilva, 2019).

Law No.17/2019

A wider variety of environmentally hazardous plastics, including single-use plastic (SUP) products and plastic carry bags, were added to the prohibition law in 2019 (Uche, 2023). The law was adopted on August 10, 2019, Rwanda's Law No. 17/2019, which repeals Law No. 57/2008, forbids the production, importation, use, and sale of plastic carry bags and single-use plastic products, which came into action on September 23, 2019.

After Rwanda's Environmental Management Authority (REMA) found that improperly discarded single-use plastics (SUPs) hindered rainwater infiltration into the soil, reducing agricultural output and contributing to flooding, the No.17/2019 law was passed (Hakuzimana, 2021).

As per Article 3, it has prohibited “manufacturing, importation, sale and use of plastic carry bags and single-use plastic items”. The below table highlights the definition of “Plastic”, “Single-Use Plastic”, “Compostable Plastic Material”, “Woven Polypropylene”, and “Recycling” as per Rwandan Law No.57/2008.

Table 1 Definitions

“Plastic”	“a material derived from petrochemicals that are lightweight, soft and non-compostable.”
“Single-use Plastic (SUP) item”	“a disposable plastic item designed to be used once before it is discarded or recycled. Single-use plastic items include plastic carry bags, oxo-degradable plastics and other items whose part is made from plastic material.”
“Compostable plastic material”	“Any material made from single-use plastic or plastic carry bags made from plant-based synthetic materials capable of undergoing biological decomposition in natural conditions.”
“Woven polypropylene”	“Polypropylene strips/threads that have been woven in two directions (warp and weft) to create a light, but strong and heavy-duty material.”
“Recycling”	“The process of collecting and processing plastic materials that would otherwise be thrown away as trash and turning them into new products.”

Source: Author-created table (Article 2 of Law No.17/2019)

The law mandates manufacturers and retailers to establish systems for collecting and segregating used plastics to facilitate recycling. As per Article 6, it is compulsory for the manufacturer, wholesaler, or retailer of “plastic carry bags and single-use plastic items to collect, segregate and hand them over to the recycling plants.”

Under the law, individuals found disposing of single-use plastic (SUP) items are subject to fines and are required to repair the environmental damage caused. As stated in Art 13, “any person who piles or disposes of plastic carry bag waste and other single-use plastic items on unauthorised public or private place is liable to an administrative fine of fifty thousand Rwandan francs (FRW 50,000) and is ordered to remove such waste repair damages caused by him or her. If the acts referred to in Paragraph One of this Article are committed by a person who has exceptional authorisation to use plastic carry bags and single-use plastic items to treat waste, he or she is liable to an administrative fine of five million Rwandan francs (FRW 5,000,000). The authorization is also suspended or withdrawn”.

As per the law, Retailers were granted a three-month grace period in 2020 to sell off goods packaged in disposable plastics, while industrial manufacturers were given two years to adapt their production processes to eliminate SUP packaging. As it states in Article 17, the law has exempted “single-use plastic items already on hand or ordered for 3 months and factories manufacturing prohibited items in Rwanda are given 2 years to comply with the law from the commencement of Law No.17/2019.

The law includes a list of sanctions depending on the violation of manufacturing, importing and retailing. Article 9-13 states the sanctions against those who violate the law. The sanctions include ending the practice that violates the law, the dispossession of illegal items, and fines. The Law provides for the dispossession of the items and payment of administrative fines in case of violation of the Law to the tune of FRW 10,000,000 for manufacturers, ten times the cost of importation for an importer. FRW 700,000 for a wholesaler and R300,000 for a Retailer of plastic carry bags and single-use plastics.

The law governing plastic carry bags and single-use plastic items in Rwanda imposes strict penalties for manufacturing, importing, wholesaling, retailing, and improper disposal of such items. Article 9 penalizes manufacturers with the closure of operations, confiscation of items, and a fine of 10 million Rwandan francs. Article 10 imposes a fine equivalent to ten times the value of imported plastic items, alongside confiscation. Wholesalers face a fine of 700,000 Rwandan francs (Article 11), while retailers are fined 300,000 Rwandan francs (Article 12). All dispossessed plastic items are managed under guidelines set by the competent authority.

Improper disposal of plastic waste attracts a fine of 50,000 Rwandan francs, with additional penalties for authorized individuals mismanaging such waste, including fines of 5 million Rwandan francs and potential suspension of their authorization (Article 13). Recidivism doubles the fines as per Article 14. Fines must be paid within seven working days, failing which interest accrues at 1.5% per day (Article 15). Enforcement of fines is managed by designated institutions, with revenues deposited into the National Fund for Environment (Article 16). Despite some criticism of the fines as oppressive, they have been credited with driving substantial compliance among citizens.

Exceptions to the ban are outlined in Article 4 of Law No. 17/2019. Exceptional cases include items such as home compostable plastics and woven polypropylene. Applications for authorization must be submitted in writing to the Rwanda Environment Management Authority (REMA), which has established detailed guidelines for granting permissions. The guidelines prioritize cases involving medical, agricultural, and industrial needs, as well as packaging for products produced locally and intended for export. The requirements ensure that economic activities, particularly exports, are not adversely affected by the ban.

However, the stringent fines were viewed by some as oppressive, they are widely credited with driving substantial compliance among citizens (Xie & Martin, 2022).

Exceptions to Law No.17/2019 are highlighted under Article 4 of the Act. It states that “a person who intends to manufacture, import, export, or use prohibited items for an exceptional reason may apply for authorization in writing”. An exception to the prohibition exists for “home compostable plastic items” and “woven polypropylene” under Art. 4.

To enforce Article 4, the Rwanda Environment Management Authority (REMA) established guidelines outlining the procedures and conditions for eligibility to grant exceptional permission to manufacture, use, import, or sell single-use plastic items or pack goods in single-use plastics. The guidelines specify who should apply, how to do it and the elements of the application file (REMA, 2019).

Article 3 of the guidelines outlines the eligibility criteria, which include medical purposes, agriculture and forestry, waste collection and sanitation, the construction industry, industrial use, and printing houses. Meanwhile, Article 2 specifies the eligibility conditions for applications concerning plastic materials used for packaging purposes. The guidelines stipulate that the product to be packaged must be produced in Rwanda, must have no alternative packaging on the local or international market, and must be intended for export. Additionally, the applicant must demonstrate that the absence of appropriate packaging material would directly and negatively impact the quality of the product. This provision ensures that the ban does not undermine the country's economic earnings from exports. (REMA, 2019).

Article 5 of Law No.17/2019 states that an environmental levy on imported single-use plastic items and goods that come packaged in plastic. As per art 6, which introduces an extended responsibility mechanism that mandates every manufacturer, wholesaler, or retailer of plastic carry bags or SUP items to put in place collection and segregation tools for their used products for recycling. Further, Article 7 equally requires that all recycling procedures must be environmentally friendly.

According to Article 8, ensuring compliance is the responsibility of multiple agencies, including the

Rwandan National Police, Customs, the Investigation Bureau, the Rwanda Environment Management Authority, the Standards Board, the Inspectorate, and the Competition and Consumer Protection Authority. These agencies are tasked with inspecting and monitoring the use, sale, manufacture, import, and export of plastic items to ensure effective enforcement of the regulations.

Organic Law No. 04/2005 of 08/04/2005

Organic Law No.04/2005 determines the modalities of Protection, Conservation, and Promotion of the Environment in Rwanda. The law delineates clear responsibilities for all parties involved, including the establishment of the Rwanda Environment Management Authority (REMA) to coordinate and oversee environmental management for sustainable development. It also created the National Fund for the Environment to regulate the financial aspects of the sector. Law No. 04/2005 creates the legal framework for all waste management activities in Rwanda. It instigates the PPP and a range of financial incentives and disincentives to promote better management of waste. According to stakeholder interviews conducted in a World Bank report, collection services have been introduced to households and communities, with an estimated 88 per cent coverage across Kigali (Rajashekar, Diallo & Loveridge, 2019).

Law No 53/2007 of 17/11/2007

Law No 53/2007 of 17/11/2007 establishing community works in Rwanda (Umuganda). Stakeholder engagement further revealed well-defined responsibilities between communities, citizens, and government institutions. Law No. 53/2007 governs Umuganda (meaning “coming together in common purpose), a monthly community work including community clean-up (Mtonga, R., 2022). This approach has significantly reduced government clean-up costs while offering reliable and sustainable methods for waste management.

The law aims to promote national clean-up efforts and empower residents by involving them in the development of rules and policies for their

communities. The law provides for compulsory community work, which aims to promote development activities in the framework of supporting the national budget and mandates every Rwandan from 18 to 65 years old to perform community work (Uche, 2023).

Umuganda, Rwanda's community service initiative, is estimated to have an economic value of up to US\$200 million. This initiative has contributed to building roads and schools and addressing the challenges of solid and plastic waste through community-driven litter clean-up activities. The government's direct financial contribution is reported to be US\$49.8 million (49.4 billion RWF), with the remainder consisting of in-kind contributions from residents and businesses within participating communities. (Mtonga, 2022).

Regulations Governing Solid waste and transportation Services of 2020

The law establishes a licensing framework for solid waste collection and transportation services. Art 1 of Regulations Governing Solid waste and transportation Services of 2020, The Regulation No 001/EWASTAN/SW/RURA/2014 of 28/8/2014 on solid waste collection and transportation services provision in Rwanda and all other previous provisions. It was made under Law N° 09/2013 of 01/03/2013 establishing Rwanda Utilities Regulatory Authority (RURA) and determining its mission, powers, organisation and functioning, especially in its articles 2, 4, 6, 8 and 20.

As per Article 24, the law requires the public to sort their waste to prevent littering during transportation and obliges licensed waste transporters to conduct awareness programmes on waste segregation, recycling, and the reuse of segregated materials.

The study of Uche (2023), which analyses the provisions of Rwandan law, along with the Law on Community Works, demonstrates that the principle of public participation is effectively implemented in Rwanda.

Research Gap

The mismanagement of post-consumer plastic packaging (P.C.P.P.) waste has arisen due to inadequate legal frameworks, insufficient infrastructure, and a lack of producer responsibility in Sri Lanka. Despite the growing demand for plastic packaging driven by urbanization and population growth, the absence of Extended Producer Responsibility (EPR) and enforceable regulations has led to escalating environmental, health, and economic challenges.

Although the NEA No.47 of 1980 (as amended) provides a general mandate for environmental management, it does not specify the post-consumer plastic packaging waste. The ban on polythene less than 20 microns in thickness through the Gazette Extraordinary No.1466/5 of 2006, as amended later in 2017 and in 2021, focused on single-use plastics but inadequately addressed the broader plastic packaging waste management (CEA, 2021). Further, even though "the National Action Plan for Plastic Waste Management 2021-2030" has been introduced, the practical implementation is limited through the agencies in Sri Lanka.

In addition to the legislative gaps, the weak implementation of the existing policies contributed to the inadequate institutional capacity, inadequate coordination among the agencies and the lack of funds for waste management (CEA, 2021). The current legal framework is focused on bans and clean-up programmes rather than preventive mechanisms such as the EPR schema, recycling obligations for producers and consumers (Wijesekara et al., 2020, UNEP, 2021).

In contrast, Rwanda signifies a successful model where implementation of Law No.17/2019 incorporates the elements of the Circular economy principle, EPR framework and Waste hierarchy model. The model follows Rwanda's concerns about public participation (e.g. *Umuganda*), levies, and fines to reduce single-use plastic has influenced a more sustainable waste management model.

The literature findings highlighted the adequacy of the legal framework for managing the post-consumer plastic packaging waste (Jayasungha & Hettiarachchi, 2022; UNEP, 2021). This loophole stipulates the legal reforms for binding Producer Responsibility, an efficient and effective waste collection system, public participation mechanism from the international best practices

Therefore, this research critically analyses legal and policy measures adopted by Rwanda to draw viable insights for the Sri Lankan legal regime. Addressing the gaps in waste management systems and introducing robust legal mechanisms to ensure sustainable plastic packaging practices, which is essential to mitigate the negative impacts of P.C.P.P. waste in Sri Lanka.

1.3 Theory of the study

In order to analyse the Rwandan Plastic regulation, the study draws on the principles of Institutional Theory, the Social-Ecological Systems Framework, the Polluter Pays Principle, and EPR. Institutional theory focuses on the impact on the stakeholder behaviours through plastic regulations and enforcement mechanisms. E.g. the effect of the strict plastic ban by the government and community programmes like Umuganda.

The Social–Ecological System Framework focuses on the interlink between humans and the environment, which highlights community engagement and the adaptive governance of sustainable plastic waste management. The polluter pays principle makes the polluter bear the cost of the environmental harm they caused, where it concerns economic incentives to minimize the plastic waste generation. This theory is further enhanced by the EPR, which gives the producer responsibility over their products’ end-of-life by utilizing the sustainable design for the packaging and the waste recovery processes, making it more environmentally sustainable.

The study highlights how Rwanda’s strategy for plastic waste management aided by the community participation, law enforcement and economic

incentives by adoption of the the above-mentioned theories towards the reduction of the plastic packaging waste. By applying these theories lessons can be learnt for improving Sri Lanka’s legal frameworks and fostering sustainable practices in managing post-consumer plastic packaging (P.C.P.P.) waste.

1.4 Research Problem

Inadequate legal framework, weak enforcement mechanisms and limited public awareness have caused plastic packaging waste to be a significant environmental challenge in Sri Lanka. Even with the presence of policies and regulations for the plastic packaging and waste management, the country’s management of post-consumer plastic packaging (P.C.P.P) waste has become haywire. On the other hand, as a result of the comprehensive legal reforms, strong institutional coordination, public-private partnerships, and community engagement caused for the successful and prolific management of plastic packaging waste in Rwanda was achieved. Hence, the legal and policy framework of Rwanda is critically analysed in this research to draw suitable insights for the Sri Lankan legal regime. Therefore, it is vital to identify and address the gaps existing in the plastic waste management and introduce a robust legal mechanism is vital to ensure sustainable plastic packaging practices and mitigate the negative impact of P.C.P.P waste in Sri Lanka.

1.5 Research Questions

- I. What lessons can Sri Lanka learn from Rwanda’s legal, institutional, and community-based approaches to plastic waste management?
- II. How can Rwanda’s strategies for promoting biodegradable alternatives and public awareness be adapted to suit Sri Lanka’s socio-economic and cultural context?
- III. What challenges and opportunities exist for implementing Rwanda-inspired public-private partnerships and circular economy principles in Sri Lanka’s plastic waste management system?

1.6 Objectives

- To analyse the key components of Rwanda's successful plastic waste management strategies, including policy frameworks, public engagement, and recycling systems.
- To assess the applicability of Rwanda's approaches, such as bans on plastics and incentives for alternatives, to Sri Lanka's unique socio-economic and cultural conditions.
- To propose recommendations for Sri Lanka to improve its plastic waste management through legal reforms, stakeholder collaboration, and sustainable innovation inspired by Rwanda.

1.7 Significance of the Study

This study addresses critical gaps in managing post-consumer plastic packaging (P.C.P.P.) waste in Sri Lanka through a comparative analysis with Rwanda's successful legal framework, offering insights for developing tailored strategies. Stressing the need for sustainable solutions to support ecological balance, it draws attention to the negative effects of poorly managed plastic waste on the environment, including pollution, biodiversity loss, and micro plastic contamination. Through an analysis of Rwanda's stringent plastic bans and community-led projects, the study promotes changes to Sri Lanka's legal systems, such as the implementation of Extended Producer Responsibility (EPR) and legally binding rules. By incorporating informal garbage collectors and encouraging grassroots involvement, it addresses health and social issues while investigating economic prospects like cost reduction, biodegradable innovation, and the advancement of a circular economy. This study fills in the gaps between theory and reality by bringing Sri Lanka's plans into line with international best practices and the Sustainable Development Goals (SDGs), providing stakeholders with a road map for managing plastic waste sustainably and equitably.

2. METHODOLOGY

This study's methodology takes a qualitative approach, utilizing a comparative case study design to examine how plastic garbage is managed in Rwanda and Sri Lanka. A qualitative approach is suitable for the in-depth analysis of the legal and policy framework and socio-cultural mechanisms of a plastic waste management system.

Academic literature and government reports are examples of secondary data, whereas legislative enactments are considered as primary data to find lessons that may be put into practice. The study looks into Rwanda's effective policies, such as the 2008 ban on plastic bags and the restrictions that followed regarding single-use plastic. The approach is based on the Social-Ecological Systems foundation and Institutional Theory, which serve as a foundation for analysing legal and policy frameworks. These theoretical frames emphasize the role of formal institutions, enforcement mechanisms, and adaptive governance in fostering sustainable practices and engaging stakeholders across multiple levels of governance.

The success of Rwanda's tactics and Sri Lanka's current practices are compared using a thematic analysis, with particular attention paid to important components such as infrastructure gaps, public awareness campaigns, and Extended Producer Responsibility (EPR). By incorporating these observations, the study seeks to develop recommendations tailored to the particular situation that will help Sri Lanka move toward a Circular Economy and sustainable plastic waste management practices.

3. DISCUSSION

Rwanda

Role of Government and Non-Governmental Organizations (NGOs)

Government of Rwanda has implemented various public awareness programmes targeted on the opening green concerning the negative impacts of the

plastic packaging waste and its impact on the environment and the importance of proper waste disposal (Uche, 2023) and the government has promoted the educational campaigns and public awareness programmes on plastic waste (Twagirayezu, 2024). Further, the incorporation of the various other organisations together with the Government also has effected towards the community awareness and proper waste management practices.

Community Engagement, Educational Programs, Media Campaigns, Government Regulations, policies and the partnership with the NGOs and International Organizations can be identified as the most common examples from the Rwandan practice in managing the plastic waste.

To keep the surroundings free from plastic waste, the communities are encouraged to take frequent cleaning-up programs with the influence of the government (Squire & Nkuruniza, 2022). Community engagement in waste management activities is highly prioritised in Rwanda (Kabera, Wilson & Nishimwe, 2019). As a result of the awareness programmes in Schools targeted on the School children have popularised the importance of the three R rules (Reduce, Reuse and Recycle) in plastic Waste Management (Dsilva, 2019).

The awareness and education programs for the students on environment-friendly habits from the early ages is one of the main targets of the Rwandan government to increase the proper waste management practices. Further, the government has used the aid of the media such as television, radio and social media to increase the community awareness on environmental impacts of plastic pollution and positive impacts results from the sustainable practices.

The regulation measures taken on banning SUP bags in 2008 have influenced public awareness. Those measures have alarmed the public to focus on the need for the reduction in consumption and for finding alternative materials. Further, the Rwandan government collaborated with the NGOs and international organisations aiming for better plastic management in Rwanda with the aid of programs

such as joint initiatives, awareness campaigns, and programs aimed at the reduction of plastic pollution.

Plastic Ban

In Rwanda, the discussions of banning plastic bags began in 2003 after the study of Kabenga and Musabe (2003), which highlighted the negative impacts of plastic bags on the environment and was funded by the REMA. The study has identified the local “discussions for anti-plastic bag action” (Behuria, P., 2021). The Rwanda government has taken steps to ban the importation and use of plastic bags below 100 microns in thickness (Behuria, P., 2021).

Thereafter, in 2008, the government imposed regulation to ban the “use, importation and manufacturing of non-biodegradable plastic bags”. Further, regulatory provisions were added concerning alternative materials such as “banana leaves, paper and cotton bags” (UNEP, 2018).

A study has highlighted that Kigali in Rwanda” has been identified as the “cleanest city in Africa” after the implementation of legislation on plastic bags in 2008 (Ogotu et al., 2023). Further, these provisions added to the government decision in giving “financial aid for plastic recycling, enforcement of the law, strict border control and strict monitoring of imports and exports of plastic bags” (UNEP, 2018).

However, the UNEP (2018) report revealed that many stakeholders have criticised the government's actions, claiming that there was no real consultation before implementing the new plastic bag regulation that was approved, affecting the country's poorest citizens.

However, the Rwandan government has decided to intervene by providing recycling facilities to manufacturers/manufacturers instead of producing more plastic bags (UNEP, 2018). Therefore, the Rwandan government found that the policy was not effective and efficient, as several inconsistencies were identified. One of the gaps identified in this consistency is the smuggling of plastic bags into and out of Rwanda and neighbouring countries (UNEP, 2018).

However, Pritish (2019) states that government officials have argued that the strict ban on plastic bags has contributed to the development of polythene bag (plastic bag) recycling facilities. Government officials are said to have claimed that the impact of the ban has helped regulate plastic bags and the pollution that can occur as Rwandan citizens continue to use them over time (Pritish, 2019). As a result, it was also revealed that Rwandan citizens have adjusted to the new regulations (UNEP, 2018) and the perceived reward is that Kigali is named one of the African cities of the future (UN-Habitat, 2011). Rwanda's commitment to environmental conservation is reflected in its efforts to enforce the ban and promote alternative, eco-friendly packaging options. Citizens and visitors to Rwanda are advised not to bring plastic bags into the country, and plastic bags are often confiscated at border crossings. It is claimed that countries that pursue services-based development strategies, which prioritise externally dependent sectors like tourism, are more likely to implement plastic bag bans, which can help bolster their green credentials (UNEP, 2018).

The success of Rwanda's plastic ban can be attributed to the structured language of the law, its phased implementation, and effective enforcement mechanisms. The law incorporates both positive and oppressive elements. On the positive side, as per Article 17 of Law No.17/2019, its gradual application included a three-year transition period before the ban, designed to build awareness and support. According to Xie and Martin (2022), initial confusion among residents and businesses, stemming from limited understanding of the ban's purpose, prompted the government to undertake extensive awareness campaigns. These initiatives highlighted the public awareness and the positive behavioural changes among the public towards the plastic pollution in Rwanda.

However, the scholars have identified that the absence of the financial support from the government focusing on the companies that are shifting towards the alternative materials and the "strict penalties, imprisonment up to one year and heavy fines" in Rwanda has backstabbed the "law's punitive nature".

Umuganda

Rwandan government has implemented an initiative called "Umuganda" to rebuild the nation to foster a shared national identity. This initiative is rooted in the Rwandan culture and traditional practices, which concern the "community support and mutual assistance" among the citizens. This nationwide initiative is held on the last Saturday of each month from 08.00 a.m. to 11.00 a.m., and to foster this initiative, the businesses are closed and public transport is restricted during the period on the particular days (Dsilva, 2019).

The citizens who are physically able aged between 18-64 years old are required to participate in this nationwide community service for example, cleaning streets, cutting grass and repairing public facilities in their neighbourhoods. Beyond its practical contributions, Umuganda serves as a platform for community engagement, offering citizens the opportunity to connect with local authorities (Danielsson, 2017).

Rwanda's strategies included comprehensive awareness campaigns, such as a monthly day dedicated to collecting plastic bags combined with educational activities to promote environmentally friendly consumption practices (Motonga, 2022). The 'Umuganda' a Kinyarwanda word that means "coming together in common purpose". It's a monthly community work (including community clean up) reintroduced to Rwandan life in 1998 as part of the efforts to rebuild the country after the 1994 genocide. Today, it takes place on the last Saturday of every month from 08:00 and lasts for at least three hours, with every able-bodied Rwandan aged 18 to 65 taking part.

Institutional Theory

Institutional Theory provides a framework for analysing how formal rules, norms, and enforcement mechanisms influence stakeholder behaviour, particularly in addressing environmental challenges. (Brammer, Jackson & Matten, 2012). In Rwanda, the government has implemented stringent laws such as Law No. 57/2008 and Law No. 17/2019, which prohibit the "manufacture, importation, and use of

plastic carry bags and single-use plastic items”. Regulations are supported by the mandatory compliance for the mechanisms for example, heavy penalties, public awareness and institutional accountability.

The institutions such as REMA and the National Fund for Environment demarcate the institutional capacities in creating the “positive behavioural changes in the public” and a “culture of environmental stewardship”. The community initiative called “Umuganda” reflects the institutionalized norms into a community behaviour. These successful initiatives, backed by the institutions together with implemented laws highlight the power and the capacity of the institutional structures towards the greater environmental achievements.

Social-Ecological Systems Framework

As Preiser et al. (2018) state, the SES identify the interrelationship between humans and the environment by highlighting the need for adaptive governance and community engagement in tackling environmental issues. Legal enforcement, together with Community-based strategies, explains the SES framework, which was successful in the Rwandan plastic packaging waste management system. The SES framework is reflected through the measures taken for waste segregation, recycling initiatives and incentives for eco-friendly materials.

Micro plastic in the soil and decreased productivity in agriculture are evident in the environmental science into the governance in Rwanda as a result of their identification of the ecological impacts of the plastic pollution.

The involvement of the SES framework is evident from the country's willingness to adapt new policies moving from LAW No.57/2008 towards expanded prohibition initiatives under Law No.17/2019. These initiatives stress sustainable management of plastic waste while furthering community participation and environmental adaptability in Rwanda.

Extended Producer Responsibility (EPR)

The law incorporates elements of Extended Producer Responsibility (EPR) by imposing an environmental levy on imported single-use plastic (SUP) items or goods packaged in plastic. It also mandates that manufacturers, wholesalers, and retailers implement mechanisms for collecting, segregating, and transferring used plastic items to recycling facilities.

The regulated Extended Producer Responsibility (EPR) is added, 1. Imposing an environmental levy on imported single-use plastic items and goods that come packaged in plastic (Art. 5); and 2. Requiring “[e]very manufacturer, wholesaler or retailer of plastic carry bags or single-use plastic items must put in place mechanisms to collect and segregate used plastic carry bags and single-use plastic items and hand them over to the recycling plants.” Art. 6. Recycling is defined in Article 2(4) as “the process of collecting and processing plastic materials that would otherwise be thrown away as trash and turning them into new products.”

Legislative E.P.R. can be identified under Article 5 and Article 6 of the Act. Where under Article 5, it has imposed “an environmental levy on imported single-use plastic items and goods with plastic packaging”.

Polluter Pays Principle (PPP)

As per Arts 2, 4, 6, 8 and 20 highlights, in addition to fines for offenders and waste collection fees, which are based on each household’s income level, the law also incorporates the Polluter Pays Principle (PPP). Under Article 13, individuals or entities responsible for the unauthorized disposal of plastic bags and SUPs are required to clean up the waste and repair any damage caused.

As Uche (2023) identifies, the success of the polythene bag ban can be largely attributed to the government's effective enforcement of the law. Enforcement measures involve random inspections, business closures, fines, and, in some cases, imprisonment for offenders. Approximately 70 to 80 business owners have been jailed for violating the ban, though fines remain the primary enforcement tool (Dsilva, 2019).

The phased implementation approach exempted SUP items already ordered or in stock within three months of the law's commencement. Manufacturers were granted a two-year grace period to comply, acknowledging potential economic impacts such as job losses (Caliendo, 2013). Rwanda's policy framework has yielded significant environmental benefits, including increased recycling rates and reduced plastic litter in drainage systems (Xie & Martin, 2022).

As the study of Uche (2023) identifies, while quantitative data on plastic reduction is limited, the implementation of Law No. 57/2008 has been associated with decreased plastic bag consumption, reduced government expenditure on street cleaning, and enhanced tourism appeal. The study further highlights that plastic bags are now rarely found in circulation in Rwanda, with materials such as textile and paper bags being reused. These changes reflect a significant behavioural shift, with alternative materials increasingly replacing plastics. Further, the study has highlighted that, if a strong coalition among plastic manufacturers and importers would have presented, then the implemented policies would have been threatened in Rwanda. Moreover, the study of Behuria (2019) identified that the success of the Rwandan plastic ban arose due to the absence of a strong private sector and limited influence from business lobbies in Rwanda.

Current Legal Framework on Plastic Waste Management in Sri Lanka.

Sri Lanka stipulates inadequate regulations to manage plastic waste. The enforcement and monitoring of the regulations are identified as weak and inconsistent (Gunawardena, 2022; Weerakoon & De Alwis, 2021). Further, low recycling rates and reliance on informal activities stipulates the chaotic stance of the plastic waste management in Sri Lanka (Gunawardena, 2022).

Moreover, unlike in Rwanda, it was identified through the research that Sri Lanka does not have Extended Producer Responsibility (EPR) enforced through legislations (Balachandra & Abeysekara, 2021). The practical implementation is lacking even

though the EPR is mentioned in the national policies due to the lack of mandatory legal enforcement (UNDP, 2021).

The systematic ban on all types of SUPs and weak monitoring and compliance are identified as the gap in plastic waste management in Sri Lanka (Jayaweera et al., 2020), as compared to countries such as Rwanda. Further, as stipulated in the studies of Gunawardena, 2022 that sectoral efforts and community based programmes on plastic packaging waste management lack the support through a legal framework (Gunawardena, 2022).

Hence, even with the presence of the regulations and policies, there is a lacuna in the side of the monitoring, enforcement and the private sector responsibilities on the plastic packaging waste management in Sri Lanka. Therefore, the gaps are in need to be addressed through the legally regularised mechanisms in order to strengthen the laws and institutional infrastructure towards an effective plastic waste management.

Analysis

Rwandas approach to Waste Management, Lessons for Sri Lanka

A progressive approach to waste management is highlighted by Rwanda's regulation implemented in 2019 focusing on Single Use Plastics (SUPs). The regulations are based on concepts and principles such as Extended Producer Responsibility, the Waste Hierarchy, and the Polluter pays Principle, targeting products such as disposable cutleries and straws. This initiative highlights the importance of stakeholder engagement in the implementation of regulations, even though it causes challenges for the industries that depend on the SUPs. Hence, similar policies need careful consideration in creating a balance between achieving environmental goals and the financial reality of the effected Industries. Therefore, continuous and flexible rollouts are vital to safeguard the industry collaboration and the customer adaptation.

Rwanda's strategy is based on recycling and waste segregation. The legal requirements for the

mandatory source separation of waste have facilitated high recycling and material recovery. Corporate support for the community-based waste collections has further strengthened these efforts. This bottom-up strategy stresses how vital the community participation actions are towards the success in implementing regulations. The effectiveness of regulations could be improved by community-based recycling programmes, as the waste management systems in Sri Lanka often tend to disjoin. However, to facilitate this initiative, investment in infrastructure and capacity building are vital requirements to ensure sustainability and adaptability.

Public awareness and education have played a vital role in Rwanda's success in mitigating plastic pollution. Umuganda is one initiative that promotes environmental stewardship and a culture of shared responsibility. This participatory initiative has influenced the public to adhere to the waste Regulations. Similar community initiatives could encourage the behavioural changes required for the long-term effects in Sri Lanka. In sync with this initiative, cultural differences and different levels of environmental awareness are vital for successful implementation.

Another vital component of Rwanda's model is the promotion of alternative materials through corporate incentives and research collaborations. Rwanda has promoted local entrepreneurship and environmental protection by promoting innovation in biodegradable and reusable products. A similar strategy that encourages the creation of a market for environmentally friendly products can be advantageous in Sri Lanka.

The public-private partnership and the adoption of corporate models have been successful in waste collection in Rwanda, mostly in the urban areas. Considering the challenges faced in Sri Lanka in Urban and Pradeshiya Saba in waste collection, the procedures followed in Rwanda would be vital for a proper waste management system in Sri Lanka. Sri Lanka could improve waste collection, optimize resource recovery, and advance circular economy principles by strengthening the public and private-

sector collaboration (Balachandra & Abeysekara, 2021). In strengthening collaboration, the benefits should be distributed equally especially considering the rural communities to stop aggravating Inequality.

The initiatives followed in Rwanda highlights how the social, economic and environmental perspectives would be concerned in tackling the plastic waste. Initiatives like the plastic bag ban and Umuganda stress how the leadership and the community are in sync, which signifies how vital the collaborative actions are towards long-term sustainable results. Even though Rwanda's recycling practices are under improvement, participation of the informal and corporate sector is sustained in achieving effective waste management in Rwanda.

Rwanda's multifaceted strategy shows how social, environmental and economic perspectives can be used for tackling the management of plastic waste. Initiatives like plastic bags ban and the Umuganda stipulates the interconnection between the community and the leadership highlighting the collaborative action for long term sustainability. Overall, Ruwandas' experience provides Sri Lanka with a vital framework for addressing plastic packaging waste. The key components include strong regulations, community participation, and technology involvement, which provide Sri Lanka with a feasible move towards circular economy and sustainable development. By modifying Rwanda's model to fit its distinct socioeconomic and cultural settings, Sri Lanka can successfully overcome obstacles to an effective plastic waste management system.

Sri Lanka's Legal and Policy Framework: Analysis of Implementation and Enforcement Gaps

A critical analysis identified that Sri Lanka lacks comprehensive and enforceable plastic packaging waste regulations. The current legal framework mainly focuses on specific product categories such as plastic bags, cutlery rather than highlighting the full range of the plastic packaging materials. The enforcement remains weak due to limited institutional capacity, lack of funding and weak

monitoring have been identified through the research studies (Weerathunga et al., 2021).

Scholarly literature points out that even though Sri Lanka has taken primary steps to regulate plastics, legal and institutional gaps persist. As De Alwis (2020), identified in the absence of regulatory mechanisms mandating the producer responsibility and comprehensive management of plastic packaging waste, ad hoc bans and restrictions are unlikely to produce sustainable output.

As opposed to Rwanda's stringent and comprehensive legal framework, Sri Lanka's legal framework remains fragmented and poorly enforced. Rwanda's prolific approach is strengthened by specific legislation, strong enforcement mechanisms and integrated community participation, neither are identified and established in Sri Lanka. Hence, Sri Lanka must implement a dedicated and comprehensive plastic packaging waste management act, backed by legally regularised EPR mechanisms to move towards a circular economy model by achieving sustainable waste management outcomes.

4. RECOMMENDATIONS

Implement strict laws banning non-biodegradable plastic bags and single-use plastics (SUPs), supported by public awareness campaigns to make citizens aware of the negative impacts of plastic waste.

Enforce waste segregation in households and businesses to increase recycling and lessen reliance on landfills.

Encourage the creation of sustainable markets for recovered and recycled materials and create a closed-loop system to minimize waste generation.

Create community-based programmes inspired by Rwanda's participatory models, encouraging grassroots involvement in segregation and recycling efforts.

Promote long-term behavioural change, implement culturally relevant campaigns and integrate sustainability into educational curricula.

Invest in cutting-edge waste management facilities with an emphasis on minimizing urban-rural differences for segregation, collection, and recycling.

Develop policies that align with international best practices, incorporating principles like the waste hierarchy, Extended Producer Responsibility (EPR), and circular economy.

Establish a staged strategy for SUP bans involving stakeholder engagement, targeted subsidies, and precise timelines for transition.

5. CONCLUSION

In Sri Lanka, the mismanagement of single-use plastics and plastic packaging (P.C.P.P.) presents serious environmental, social, and economic problems. Sri Lanka can adopt extensive reforms by taking inspiration from Rwanda's innovative approaches, which include strict prohibitions on hazardous plastics, improved systems for recycling and segregation, waste-to-energy technology, updated landfill management, and vigorous public awareness campaigns. These policies offer a framework for addressing plastic waste and are based on the ideas of the circular economy and public-private cooperation. Sri Lanka can reduce plastic pollution, move toward a circular economy, and advance sustainable development for a healthy future by incorporating international best practices, encouraging innovation, and encouraging stakeholder engagement.

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