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2024

Business of Change Compendium

Smart Solutions to Supply Chain Problems in Plastic Waste Management (PWM)

INDIA SANITATION COALITION
BUILD • USE • MAINTAIN • TREAT

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Smart Solutions to Supply Chain Problems in Plastic Waste Management (PWM)

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We are also grateful to our knowledge partners, Grant Thornton Bharat, for their expertise, research, and insights, which have significantly enriched the development of this compendium. Their collaborative efforts and valuable contributions have ensured the accuracy and comprehensiveness of the best practices included in this document.

Finally, we would like to express our sincere appreciation to all the contributors who generously shared their time, knowledge, and experiences. Their expertise and passion for addressing the issue of plastic waste management have been crucial in creating a practical, forward-looking resource for practitioners and policymakers alike.

Together, these efforts have resulted in a document that we hope will serve as a vital tool in the ongoing pursuit of effective, sustainable solutions to the challenges posed by plastic waste.

Thank you all for your dedication and support.

Message

Naina Lal Kidwai
Chair, India Sanitation Coalition

Modern challenges often require modern solutions, and India's growing plastic waste issue calls for some innovative thinking and collaborative approaches. As one of the largest consumers of plastic, the country generates an estimated 3.4 million tons of plastic waste annually. A significant portion of this waste is not managed effectively, finding its way into landfills, rivers, and urban drainage systems, which has far-reaching environmental, health, and economic consequences for communities across the nation.

One of the primary challenges is the widespread use of single-use plastics, such as packaging, bottles, and disposable items, which contribute heavily to the waste stream. Although approximately 60% of plastic waste is processed, the remaining 40% often escapes the waste management system, eventually degrading into microplastics that contaminate ecosystems and pose risks to biodiversity, public health, and livelihoods. Addressing this challenge requires a multi-pronged approach that encompasses policy, infrastructure, and behavioural shifts.

On the policy front, India has taken bold steps such as the 2022 ban on single-use plastics and the implementation of Extended Producer Responsibility (EPR) regulations, creating a framework for accountability among producers and reducing plastic consumption. The establishment of state and national task forces, comprehensive action plans, and online platforms like the National Dashboard for monitoring plastic waste management underscore the government's commitment. Yet, there remain significant opportunities to scale these efforts and ensure consistent enforcement.

The journey toward sustainable plastic waste management demands collective action, including strong government regulations, corporate responsibility initiatives, and community-driven efforts. A focus on circular economy models, innovation in waste processing technologies, and sustained public awareness campaigns will be critical in turning this challenge into an opportunity for progress.

In this context, I am delighted to see the India Sanitation Coalition at FICCI and Grant Thornton Bharat coming together to address this pressing issue with this meticulously curated compendium. This publication highlights innovative strategies, best practices, and success stories from across the country, offering valuable insights into effective plastic waste management. It serves as a testament to the power of collaboration in tackling complex challenges and provides a roadmap for meaningful progress.

As we explore the pages of this publication, we uncover not only innovative solutions but also the spirit of partnership and shared responsibility essential for achieving impactful results. These efforts reinforce the vision of a cleaner, healthier, and more sustainable environment, and I extend my best wishes for the continuing success of this endeavour.

Preface

Dr. Abhinav Akhilesh
Partner and Leader,
Grant Thornton Bharat

As India marches toward the vision of Viksit Bharat, a developed and resilient nation, the challenges, and opportunities of sustainable waste management take center stage in this transformation. This compendium, developed in collaboration with the India Sanitation Coalition (ISC), reflects the collective efforts of policymakers, industry leaders, and grassroots organizations in advancing innovative and inclusive solutions for a cleaner, greener future.

At Grant Thornton Bharat, we take pride in serving as knowledge partners for this initiative. Our dedication to sustainability resonates with the vision of Viksit Bharat, highlighting the importance of comprehensive solutions that balance environmental care, social responsibility, and economic growth. Addressing the challenges of plastic waste management is a crucial milestone in realizing this national aspiration and shaping Vibrant Bharat.

This compendium presents a diverse array of case studies and smart solutions that exemplify the transformative power of collaboration. These initiatives, ranging from decentralized waste management models to digital innovations and community-driven programmes, highlight the potential to create scalable and sustainable impact across India. By bringing together best practices and success stories, this compendium serves as an inspiration to reimagine the plastic waste value chain and catalyse meaningful change.

We sincerely thank all the contributors whose insights have greatly enhanced this document. Together, we can drive progress towards Viksit Bharat, inspire innovation, and shape a resilient and prosperous future for India.

Preamble

The compendium on **SMART (Sustainable, Measurable, Achievable, Replicable, and Timely)** solutions in plastic waste management seeks to serve as a definitive resource showcasing pioneering approaches to address the global growing plastic waste challenge. As plastic waste levels surge due to urbanization, rising consumption, and industrial growth, there is an urgent need for effective solutions to mitigate the impact on the environment, human health, and the economy. The compendium aims to highlight innovative practices that prioritize sustainability, efficiency, and scalability, while inspiring cross-sector collaboration to expand these solutions across the country. By documenting real-world cases with measurable impact, it encourages stakeholders to replicate and adapt effective methods in diverse settings. Additionally, the compendium provides evidence-based insights to support policy development, offering data and case studies to inform frameworks that will enhance regulations, standards, and incentives for plastic waste management in India. Ultimately, the publication promotes a circular economy mindset, advocating for approaches that reintegrate plastic waste into the value chain rather than dispose of it, aligning with India's goals for a more sustainable and responsible future. It also provides interesting insight into alternatives to plastic such as environment friendly packaging options.

Who should use it?

The compendium is a comprehensive resource tailored to a wide array of stakeholders invested in or impacted by plastic waste management:

- Policymakers and Urban Local Bodies: For those involved in developing policies and regulations around waste management, the compendium serves as a resource to understand practical solutions that can guide policy recommendations and regulatory frameworks.
- Industry Leaders and Corporate Sustainability Teams: Private sector stakeholders looking for innovative, actionable solutions for waste management within their operations will find the compendium valuable for its real-world examples of sustainable practices.
- Entrepreneurs and Startups: It serves as a resource for innovators seeking inspiration or validation of business models in the recycling, waste management, and circular economy sectors.
- NGOs and Environmental Organizations: By showcasing scalable projects and successful public-private partnerships, the compendium provides insights into how civil society can play a crucial role in implementing and advocating for effective waste management practices.
- Academicians and Researchers: The compendium offers a compilation of case studies, statistics, and emerging trends that can be used for further research, contributing to the academic discourse around sustainability and waste management.

Context

The pervasive presence of plastic in our daily lives often makes it difficult to fathom that it is a relatively modern invention. From the moment we wake up till we go to bed, plastic is woven into the fabric of our existence. Be it our plastic toothbrush, water bottles and meal containers, potato chip packets, toys and TV remote, plastic is everywhere. Its convenience and versatility have made it a staple in countless products, shaping the way we live, work, and interact. Yet, this ubiquitous material is a recent addition to our world, emerging in the early 20th century. Initially celebrated for its durability and lightweight nature, plastic quickly transformed industries, revolutionizing

packaging, manufacturing, and consumer goods. Since the 1950s, the world has produced more than nine billion metric tons of plastics, more than half of which was brought to market after 2000. However, as its use skyrocketed, so did the environmental consequences.

The ease of production and disposal has led to a throwaway culture, where single-use plastics dominate our consumption patterns. Today, the world is grappling with the long-term effects of plastic pollution, from oceanic gyres filled with microplastics to the countless wildlife affected by plastic waste. This contradiction—the rapid rise of plastic as a hallmark of modern life and its detrimental impact on the environment—forces us to reconsider our relationship with this material.

The Plastic Paradox

Because nearly all plastics (99 percent) are made from fossil fuels, our addiction to plastic also impacts the climate. In fact, the plastics industry is currently responsible for four times more greenhouse gas emissions than the airline industry. And even if production were to stay level, plastics are projected to account for 15 to 19 percent of the global carbon budget by 2050. Plastic production emits greenhouse gases at every point in its life cycle. This begins with the process of drilling for the building blocks of plastic: oil and gas. At the next stage, the industry relies on highly polluting and energy-intensive "cracker plants," where ethane molecules from natural gas are cracked into the chemical building blocks of plastic. Finally, the end-of-life phase can involve incinerating plastic waste which further contaminates the air. The issue becomes significantly grimmer when we also take into account the pervasiveness of microplastics. Microplastics are tiny plastic particles measuring less than 5 millimeters in diameter, which have emerged as a significant environmental concern in recent years. These particles originate from various sources, including the breakdown of larger plastic debris, such as bottles and bags, and from the shedding of microfibers from synthetic textiles during washing. Microplastics are pervasive, found in oceans, rivers, soils, and even the air we breathe, raising alarming questions about their impact on ecosystems and human health. In aquatic environments, microplastics can be ingested by marine organisms, ranging from small fish to larger predators, potentially leading to harmful effects such as reduced growth, reproductive issues, and even death. Furthermore, these particles can act as vectors for toxic chemicals and pollutants, accumulating harmful substances that may enter the food chain, ultimately affecting human consumers. Studies have detected microplastics in various food products, including seafood, salt, and even drinking water, highlighting the troubling reality of plastic contamination in our diets.

Multiple studies have now detected microplastics in human blood, heart and reproductive system. The full long-term impact of microplastics on human health are still largely unknown, but dozens of research studies have linked the particles to lung inflammation and a higher risk of lung cancer, metabolic disorders, neurotoxicity, endocrine disruption, weight gain, insulin resistance, and decreased reproductive health.

The persistence of plastic in the environment, combined with its potential to cause harm, underscores the urgent need for comprehensive research, effective policy measures, and sustainable alternatives to plastic use.

The diary of cases featured in this compendium attempt to address the plastic issue from the reduce, reuse and recycle perspective, along with safe management of plastic waste. It features innovations to reduce the use of plastic such as bio-degradable packaging, community-based interventions that focus of spreading awareness about segregation of plastic waste and use of technology to reuse and recycle and finally programmes to ensure safe end-of-life disposal of plastic waste.

Acronyms and Abbreviations

3P	Procure, Process, Produce
3R	Reduce, Reuse, Recycle
5Rs	Refuse, Reduce, Reuse, Repurpose, Recycle
AI	Artificial Intelligence
B2B	Business-to-Business
B2G	Business-to-Government
BBMP	Bruhat Bengaluru Mahanagara Palike
BPL	Below Poverty Line
C&D	Construction and Demolition
CAGR	Compound Annual Growth Rate
CBO	Community Based Organisation
CC	Collection Centre
CEE	Centre for Environment Education
CO2	Carbon Dioxide
CPCB	Central Pollution Control Board
Crs	Crores
CSE	Centre for Science and Environment
D2C	Direct to Consumer
DDWS	Department of Drinking Water and Sanitation
DIY	Do It Yourself
DoEFCC	Department of Environment, Forest and Climate Change
DRDA	District Rural Development Authority
EHS	Environment, Health, and Safety
EPR	Extended Producer Responsibility
EU	European Union
FICCI	Federation of Indian Chambers of Commerce & Industry

FINILOOP	Financial Inclusion and Improved Livelihoods out of Plastic
GCP	Global Consumer Packaging
GP	Gram Panchayat
GPIC	Gram Panchayat Implementation Committee
GPWSC	Gram Panchayat Water and Sanitation Committee
GRS	Global Recycled Standard
GSSG	Gram Swarajya Samiti Ghoshi
GST	Goods and Service Tax
GT	Grant Thornton
HCLF	HCL Foundation
HDPE	High-density Polythene
IEC	Information, Education & Communication
IoT	Internet of Things
ISC	India Sanitation Coalition
ISO	International Organization for Standardization
IT	Information Technology
IWW	Informal Waste Worker
J&K	Jammu and Kashmir
KPI	Key Performance Indicator
LDPE	Low-Density Polyethylene
LED	Light-Emitting Diode
LHI	Light House Initiative
LMS	Learning Management System
LSBA	Lohiya Swachh Bharat Mission
LVP	Low-Value Plastic
M&E	Monitoring and Evaluation

MCC	Material Collection Centre
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
MIS	Management Information System
ML	Machine Learning
MLP	Multi-Layered Plastic
MNC	Multinational Corporation
MoEFCC	Ministry of Environment, Forest and Climate Change
MRF	Material Recovery Facility
MT	Metric Ton
NCC	National Cadet Corps
NGO	Non-Governmental Organisation
NSS	National Service Scheme
O&M	Operation and Maintenance
ODF	Open Defecation Free
PET	Polyethylene Terephthalate
PIBO	Producer Importer Brand Owner
PLA	Participatory Learning and Action
PMC	Project Management Committee
PO	Purchase Order
PP	Polypropylene
PPCP	Public Private Community Partnership
PPE	Personal Protective Equipment
PRF	Plastic Recovery Facility
PRI	Panchayati Raj Institution
PS	Polystyrene
Pvt Ltd	Private Limited

PWM	Plastic Waste Management
PWMU	Plastic Waste Management Unit
R&D	Research and Development
RACE	Reduction, Awareness, Circular (Solutions), Mass (Engagement)
RRC	Resource Recovery Centre
RWA	Resident Welfare Association
SBM	Swachh Bharat Mission
SBM-G	Swachh Bharat Mission - Grameen
SDG	Sustainable Development Goals
SHG	Self Help Group
SKU	Stock Keeping Unit
SMA	Swachhata Mitra Application
SMART	Sustainable, Measurable, Achievable, Replicable, and Timely
SME	Small and Medium Enterprises
SUP	Single-Use Plastic
SWM	Solid Waste Management
SZW	Saahas Zero Waste
TV	Television
UDD	Urban Development Department
ULB	Urban Local Body
UP	Uttar Pradesh
USP	Unique Selling Proposition
VBIN	Value Bin
WIMC	Ward Implementation and Management Committee
WMA	Waste Management Agency
WPU	Waste Processing Unit

Summary

S. No	Case Title	Implementation By	Scale	Challenges Catered	Impact	Project USP
1	Saharanpur Waste Management Model: A Community Driven Solution to Tackle Plastic Waste in India's Tier-3 Cities	ITC	City level	Minimal segregation of waste leading to mixed waste and inappropriate recycling of plastics	Plastic waste recovery increased from 61 MTs in 2019-20 to 127 MTs in 2023-24	Mohalla Committees
2	Waste Management leveraging Technology for Monitoring in Ganga Grams, Bihar	ITC	Villages on the banks of River Ganga	Solid and Liquid Waste if uncatered resulting in run-off affecting aquatic life in River Ganga	1,292 MTs of plastic collected and managed	Swachhta Mitra Application & Game based learning
3	Samuday: Community Mobilisation	HCL Foundation	District level	Lack of segregated waste collection, proper infrastructureand disposal system at Municipality level	74% of household in Hardoi district, Uttar Pradesh segregating waste at source	Plastic upcycling for community beautification
4	Web Application	Trashify	City level	Lack of data for waste facilities resulting in inefficient management of the facilities	One pilot programme has been completed in EU Others are ongoing and several in the pipeline	Start-up, data technology solution
5	FINILOOP	WASTE	City level	Lack of waste management system and appropriate living conditions of informal waste workers	60 to 1,916 informal waste workers have received health services, education, livelihood training 28 existing enterprises received coaching 17 start-ups supported	Strengthening sustainable enabling environment for plastic waste management
6	Empowering Women Self-Help Groups through Sustainable Livelihoods: A Transformational Tale	Centre for Environment Education (CEE)	GP level	Plastic waste recycling and reduction	Sustainable livelihood for women (INR 5,000 to INR 7,000 per month)	Empowered SHGs for generating wealth out of waste and reduction in plastic use through Bartan bank
7	An Ecosystem Approach to Waste Management	Saahas Zero Waste	District level	Maximum recovery of resources to ensure zero waste to landfill	42,122 MTs of waste managed 94,817 MTs CO2 eq. of GHG emission reduced 6,775 MTs of plastic recovered from coastal regions	Creating a well-defined and traceable waste management model using IoT

S. No	Case Title	Implementation By	Scale	Challenges Catered	Impact	Project USP
8	BasicShit: Recycled Toilets	BasicShit	City level	Develop accessible toilet units from waste recycling	Every dry toilet unit is made from 120 kg of plastic trash, equivalent to 8,740 bottles	Developed eco-friendly public toilet made out of single-use plastic which is thrown away as garbage.
9	Cigarette Butt Recycling	Code Effort Pvt Ltd	District, City, & State level	Cigarette butts end up as litter	Around 1.5 tonnes of cigarette butts are procured daily through this initiative	Pioneers in cigarette butt recycling
10	Menstrual Waste Management	PadCare Labs	City level	Sanitary pads can take almost 500-800 years to decompose meaning every pad ever used still exists in the ecosystem	Recycled 4.9 million pads and conserved 249 MTs of CO_2 equivalent to date	Recovering and recycling plastic from used menstrual pads
11	RACE Campaign	GIZ	State level	Lack of plastic recycling behaviour amongst community	Introduction of circular economy model in the state of Uttar Pradesh	State level IEC Campaign
12	TBD	GIZ	City level	Low-value plastic waste that end up as legacy waste and unrecycled	Handling of 62 MTs per month of low-value plastic by Tambaram municipal corporation	EPR and Plastic Credits
13	Swachh School Swachh Shehar Campaign	Grant Thornton & Akshar Foundation	City level	Lack of cleanliness behaviour, hygiene and sanitation practices, including poor waste management at schools, community, by ULBs	Pilot at 10 schools scaled to 20 schools and expected to scale further to 100 schools with support from Guwahati Municipal Corporation	Young Swachhata Ambassadors
14	Sustainable PWM via Harita Karam Sena and SHGs	GIZ	City level	Limited plastic waste processing capacity and poor level of waste segregation Lack of community participation Lack of technical know-how among local authorities in efficient plastic waste management	Streamlined SHGs towards efficient plastic waste management in Trivandrum city of Kerala	Digital training for SHGs

S. No	Case Title	Implementation By	Scale	Challenges Catered	Impact	Project USP
15	ClimaOne	ReCircle	System level with clients	Lack of transparency and traceability of waste streams from source to recycling for EPR and Plastic Credits	Introduction of transparent platform to enable EPR and Plastic Credits	Proprietary clean-tech platform to digitize plastic waste supply chain
16	Udupi Zilla Panchayat: Rural Circularity Solutions	Udupi Zilla Panchayat	District Level	Lack of plastic recycling practice among Gram Panchayats in Udupi	Installed first MRF in a rural area in Karnataka 56% of waste is now segregated into plastic categories	First MRF in rural area in Karnataka
17	Integrated Decentralized Solid Waste Management	Aga Khan Foundation	City level	Lack of efficiency in solid waste management leading to mixed waste	Introducing financial stability, community engagement & knowledge sharing for an integrated solid waste management system in Patna City	GPS-enabled vehicles & Citizen Leaders
18	Techno-Market Analysis on Multi-Layered Plastic	Grant Thornton	Cluster level			
19	Circular Economy for Plastic Packaging	3R Solutions	System level with clients	Lack of circularity model for plastic packaging in paints and lubricant industries	Reduced 1,500 kg of virgin plastic use Prevented 3,200 litres of water contamination Achieved ~3 MTs in carbon emission reductions	Reduction in the use of virgin plastic
20	Tetra Pak: Supporting Community Empowerment	Tetra Pak	City level	Lack of a supporting environment for waste picker	Supporting schooling of children and providing upcycled school furniture made from Tetra Pak cartons Introducing responsible Used Beverage Carton Collection (UBC) and recycling practices to improve health conditions of waste picker communities Boosting waste picker income by incentivizing UBC collection and offering alternative livelihoods	Integrated multi-sector initiatives to support waste pickers

Diary of Case Studies

7.1

ITC

Saharanpur Waste Management Model: A Community Driven Solution to Tackle Plastic Waste in India's Tier 3 Cities

1. Programme Overview

Saharanpur Municipal Corporation (SMC) had initially started waste management by installing open community bins in different localities. Dumped waste from these bins, including **plastic waste**, was collected by Municipal workers and transported to landfill sites. However, SMC was struggling with challenges such as inadequate service coverage and operational inefficiencies; minimal source segregation, leading to mixed waste complicating recycling efforts; lack of appropriate recycling initiatives for plastic materials; and indiscriminate landfill-based disposal, where valuable plastic resource was getting lost.

ITC, having decades of association with Saharanpur including enduring relationships with stakeholders through its Mission Sunehra Kal's interventions, came to know of these challenges, and, in 2017, initiated a **Public Private Community Partnership** Programme (PPCP) with SMC, for developing a **Community-led Decentralized Waste Management Model**. The Model has since evolved over the years based on stakeholder feedback and emerging context, by incorporating changes in design elements as appropriate.

The key tenets of the Model include:

Community Engagement and Empowerment:
• **Mohalla Committees, with significant and active participation of women**, formed and nurtured to get actively involved in waste management practices and foster a sense of ownership and responsibility.
Decentralised Waste Management:
• Establising **localised systems for waste collection and processing**, which includes promoting **Material Recovery Facility (MRF)** Centers to efficiently **sort and recycle plastic materials**.
Recycling Initiatives:
• Collaborating with local recyclers to create robust recycling pathways for plastic waste, thereby **reducing landfill dependency and maximising recource recovery**.
Collaborative stakeholder partnerships & sustenance:
• It is a **Public Private Community Partnership Model** which involves Saharanpur Municipal Corporation, ITC Limited, ITC Partner NGOs (FORCE and Umang Sunehra Kal), Mohalla Commitees and residents of Saharanpur to ensure a unified approach to sustainable plastic waste management. • Financial sustenance through **household levy (User Fees)** and **sale of compost and recyclables**. • Environmental sustainability through managing waste closer to source by segregation, low-cost composting and recycling of plastic waste. • Operational sustenance through Mohalla Committees, who are primarily responsible for spearheading the waste management activities in their locality.

2. Relevance

Urban areas face severe waste management challenges, especially plastic waste. Saharanpur, a Tier 3 city in Uttar Pradesh, has 1.6 lakh households across 70 Wards and generates about 120 MTs of waste daily. This includes plastic waste of 4.5 MTs comprising of 2.58 MTs of Recyclable Plastic and 1.92 MTs of Non-Recyclable Low-density Polythene (LDPE) & Multi-layer Polythene (MLP)[1]. Much of this waste, particularly plastic, wasn't being properly disposed of, causing environmental hazards such as groundwater contamination and greenhouse gas emissions, soil contamination, and health hazards because of waste triggered clogged drains. Furthermore, the existing system had limited engagement with the community, which resulted in low levels of participation and therefore low ownership of the process.

A successful solution to these challenges could become a model for other similar towns and cities, and when implemented at scale, could address the national and global challenge of waste including plastic. The Programme is also aligned with India's Swachh Bharat Mission 2.0 and contributes to Sustainable Development Goal (SDG 6: Clean water and sanitation).

3. Detailed Programme Description

ITC's Programme uses a decentralised approach and aims at **minimising waste to landfill including plastic waste by encouraging source segregation**. It is implemented in a **closed-loop waste management model** that helps convert biodegradable waste to useful **compost**, and **recycling and upcycling** of **plastic waste**.

Programme is designed on the principle of **partnerships with**:

- **Community Based Organisations (CBOs)** to encourage participatory planning and ownership. **Mohalla Committees (MC)** with women members at the forefront are driving behaviour change communication, adopting source segregation and home composting, record-keeping, and monitoring.
- **Municipal Corporation** to drive scale and sustenance
- **Recyclers** to ensure scientific disposal of dry waste, especially **plastic recycling**
- **Involving and integrating waste collectors**

12,000 households are engaged in home composting through pot, bucket, and drum composting, transforming kitchen waste into nutrient-rich compost. Additionally, **78,000 households** are managing their wet waste through community composters. This combined effort ensures that wet waste is effectively managed at source, reducing waste sent to landfills, lowering transportation and processing costs, and promoting sustainable gardening and environmental practices across the community.

[1] *Source: Primary data collected from the programme intervention locations in Saharanpur District of Uttar Pradesh.*

Image 1: Kamela Colony MRF, Capacity: 35 MTs per day

Waste recycling process: 10 Material Recovery Facilities (MRFs) have been developed by SMC replacing traditional garbage dumping points. Operations of MRFs is outsourced to experienced authorised vendors of SMC, to optimise the efficiency and effectiveness of MRF operations.

Waste collectors **sell the recyclables** collected from households **including High-density Polythene (HDPE) to deployed scrap vendors of SMC** through a transparent process of price discovery, which adds to their **monthly income.** Remaining dry waste which are non-recyclables, are mainly sent to the nearest MRFs. MRFs provide dedicated and decentralised spaces across the city for sorting and storage of plastic waste.

MRFs are also used for Information, Education and Communication (IEC) purposes for community on circular economy.

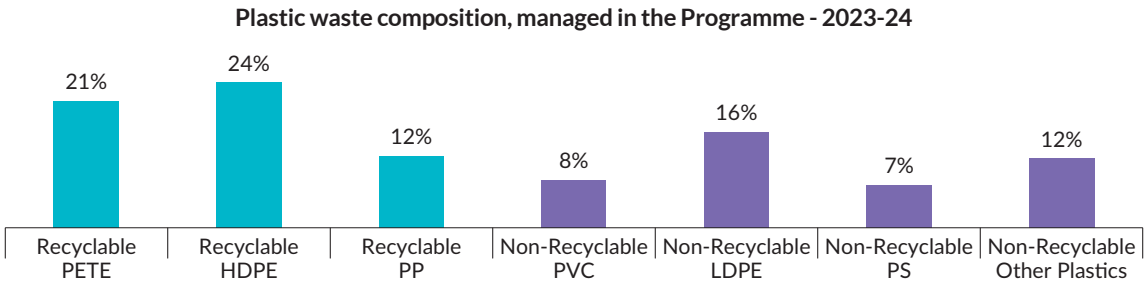
At the MRFs, the sorters, deployed by vendors of SMC, do sorting of the recyclables and plastic waste. **Sorted plastic waste (mainly LDPE and MLP) is then baled and sent to recyclers,** and the remaining waste sent to local **cement industry** to be used as an **alternative fuel.** Also, **plastic waste is now being upcycled to make benches, desks and pavers**, which are used in Government **Schools** and **Supplementary Learning Centres** of **ITC MSK's Education Programme.**

Initially implemented as a pilot in few Wards of Saharanpur, the Programme was scaled up to the entire city in 2017 as a PPCP with the Municipal Corporation. Currently, ITC is operating in all 70 Wards covering 1.54 lakh households. In 2023-24, 17,000 MTs of waste was managed, of which 767 MTs was plastic (57% recyclable and 43% non-recyclable).

Image 2: Sorting of plastic waste at Kamela Colony, MRF

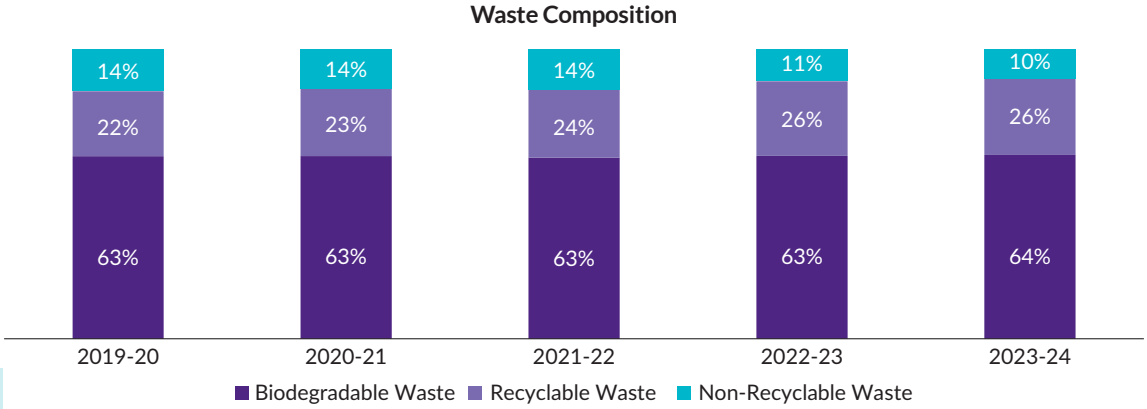
The Programme has reduced plastic pollution and promoted environmental sustainability. Ensuring that biodegradable and plastic waste is separated at the household itself has led to minimising the waste sent to landfills. This has also led to improvement in urban hygiene, reduced disease vectors, and contributed to better air and water quality.

Graph 1: The graph shows composition of plastic waste that was managed in the Programme in 2023-24



2019-20 was when the Programme stabilised. Due to fully operational MRFs and improved source segregation, waste recovery especially from dry waste is improving year on year, and percentage of non-recyclable waste which goes to landfill coming down.

Graph 2: Waste Composition



Dry waste recovery at the MRFs increased significantly from 61 MTs in 2019-20 to 127 MTs in 2023-24.

4. Smart Solution

The Programme is focused on building innovative, community-driven solutions for managing plastic waste whilst also enabling economic opportunities for waste collectors and creating value from waste through upcycling and recycling initiatives.

Community Involvement through Mohalla Committees and Women-Led Initiatives: As detailed earlier, this is a smart solution as it involves the generators itself in the process. This participatory approach is crucial for building long-term sustenance.

Well-being Initiatives for Waste Collectors: This is another smart people centric approach that includes health check-ups, insurance, financial literacy training, and educational support for their families. By addressing the socio-economic challenges faced by them, it ensures their sustained interest and active involvement in the waste management process.

Material Recovery Facilities (MRFs): The MRFs are equipped with technology to sort plastic waste into various categories, such as High-density Polythene (HDPE) and Low-density Polythene (LDPE). This allows for efficient recycling and upcycling processes.

Plastic Collection Banks: A game-changer in streamlining plastic waste management, residents deposit their segregated plastic waste in these banks, reducing load on traditional waste management systems while encouraging more active community participation.

Decentralised Recycling Model: This ensures that plastic is recycled closer to the source of generation, not only enabling resource efficiency, but also empowering local communities to manage their plastic waste in a sustainable manner.

Digital Kabadiwala Initiative: This system has strengthened the plastic recycling process. Waste collectors are organised into digital networks via WhatsApp groups, allowing them to coordinate the collection and sale of recyclable plastic more effectively. It increases recycling efficiency and helps access better markets for recyclable plastics, improving their income.

Upcycling and Circular Economy Initiatives: Multi-Layered Plastics are sent to cement plants. Plastic waste is also upcycled into products such as benches, school furniture and tiles, reducing the need for virgin plastic production whilst providing useful goods for local communities. This approach supports a circular economy where plastic is repurposed, instead of being discarded.

Image 3: Upcycled furniture and equipment from LDPE and MLPs

5. Financial/Revenue Model

Operational and Financial sustenance of the Programme is inbuilt from day one of the roll-out. The operational cost for waste management is presently about INR 39/- per household on a monthly basis, which is almost 40% less than that incurred in traditional waste management system. The key driver for this is the decentralised approach that reduces investments and reduces operational costs. This gets further aided through community participation and contribution.

The operations are managed by Mohalla Committees (MC) and financial sustenance is ensured through User Fees on a voluntary basis and resource recovery. The technologies adopted for the Programme are simple and low cost like cycle rickshaws for waste collection and decentralised composters. There have been instances where waste collectors have themselves invested on a rickshaw for livelihood and some MCs have also contributed towards low-cost composters.

Revenue is generated through three main sources:

User Fees: About 95% of beneficiary households contribute INR 53 lakhs monthly, up from INR 3 lakhs in 2017. These fees primarily support waste collectors' honorariums and equipment maintenance, managed by Mohalla Committees.

Sale of Compost: Currently generating around INR 3 lakhs monthly, compost sales provide additional income for waste collectors.

Sale of Recyclables and MRF Rent: Waste collectors and sorters earn INR 7 to 8 lakhs monthly from recyclable sales boosting their income.

The Programme, led by the community, also successfully integrates informal waste collectors into a formal waste management system, enhancing their working conditions and livelihoods. This coupled with focus on well-being of their families has ensured their motivated and continued participation, and thus ensuring efficiency and effectiveness of the Programme.

6. Partnerships

The Programme has multiple stakeholders with each having a set of roles and responsibilities to collectively and collaboratively drive the larger goal of promoting healthy and hygienic environment. The key stakeholders include:

ITC designed the **Public Private Community Partnership** Programme (PPCP) with Saharanpur Municipal Corporation for promotion of the **Decentralised Waste Management** model. ITC as an orchestrator provides strategic inputs and supports Corporation in facilitating the Programme.

Implementation Partners: Force and Umang Sunehra Kal Sewa Samiti, the field implementation partners of ITC play a crucial role in executing the Programme at the grassroots level. They are responsible for training community members, facilitating waste collection processes, and ensuring that waste management practices are adhered to. Their local presence and expertise foster effective communication and collaboration between the community and Municipal authorities.

District Administration including the **Municipal Corporation** provides critical support and oversight for the Programme, ensuring alignment with broader Government policies and initiatives. They facilitate inter-departmental coordination and mobilise resources necessary for implementation. They also play a vital role in monitoring progress, evaluating outcomes, and addressing any challenges that arise during the execution of the Programme.

Empowered community institutions like Mohalla Committees work closely with the Municipality and other Departments for linkages, and with waste collectors' representatives for mobilisation and designing of interventions for their socio-economic well-being. These Committees also help disseminate awareness on source segregation, environment degradation and related health hazards.

Residents individually and also collectively as part of Mohalla Committees, participate in the process whole-heartedly. They also keep a check on the quality of work and are responsible for User Fees payment and collection, and thereafter honorarium payment to waste collectors.

Other ecosystem players like Local Banks, UP State Livelihood Mission, Common Service Centres, Local Employment office etc, are involved for economic and social inclusion of waste collectors.

7. Programme Amplification

- The Saharanpur model with Mohalla Committee in the forefront was shared by SMC with Urban Development Department (UDD), Government of Uttar Pradesh. **UDD subsequently entered into an agreement with ITC** for **knowledge and handholding support covering 85 ULBs.** The Programme has already reached out to **29.62 lakh households with 11,000 Mohalla Committees.**
- Based on the Saharanpur experience, Government of Bihar has partnered with ITC to build capacity of Government officials to roll out Community led rural sanitation Programme in **261 Ganga Gram villages in 12 Districts covering about 5.4 lakh households.**
- ITC has adopted elements of the Saharanpur Programme as part of its involvement with the **Light House Initiative (LHI)** of Ministry of **Drinking Water and Sanitation (DDWS),** Government of India along with **India Sanitation Coalition (ISC)** under SBM 2.0. In the first phase, the initiative aims to create **75 Gram Panchayats across 15 States as "Lighthouses"** for rural sanitation and waste management**. ITC is working in 36 GPs in 10 States and 22 have already been declared as Light Houses.**

8. Information, Education & Communication (IEC) Model

ITC identified communities as change agents and Municipal Corporation as the facilitator.

Initially, community members were reluctant to take ownership for waste management as they considered it to be the responsibility of civic body. Since the success of the Programme depended on communities owning it, **behaviour change of the communities** emerged as the biggest challenge. Unique aspects of ITC's IEC efforts included:

Localised Messaging through Community Influencers including religious leaders made the communication more relatable and trustworthy, driving quicker behaviour change.

Women-Centric Messaging as women played a key role in household waste management.

Kitchen Segregation Stickers placed in kitchens provided simple visual instructions for segregating wet and dry waste, serving as constant reminders for family members to practice waste segregation at source.

Smart Parivaar' Stickers at households practicing proper segregation and paying User Fees consistently. This was a visible recognition and motivated neighbouring households to follow suit, fostering a sense of healthy competition within the community.

Demonstration-Based Awareness showcasing the benefits of waste segregation and recycling. Households could see first-hand how their actions directly impacted the income of waste collectors and the cleanliness of their locality.

9. Programme Monitoring and Evaluation

Monitoring is done through regular meetings between ITC, the Municipal Corporation, and other stakeholders, including NGOs and Mohalla Committees. The plastic waste management process, including the functioning of plastic collection banks, MRFs, and the Digital Kabadiwala initiative is reviewed regularly.

Data Collection: Waste collection and segregation data is recorded on a daily basis by staff from the NGOs partner and Municipal officials. This data helps track household participation, volume of waste collected, and the proportion of recyclable plastic processed.

Swachh Mitra App: This digital tool helps track daily data collected, recycling trends of different dry waste categories being moved for recycling through MRFs. It also helps Corporation officials and Mohalla Committees to take informed decisions on involving the ecosystem stakeholders and look for inclusivity of waste-pickers.

Regular Assessments: ITC, SMC and local stakeholders conduct meetings on a monthly basis to assess progress and also quickly resolve any operational challenges.

Community Feedback: Feedback loops with Mohalla Committees on a monthly basis as a participatory approach ensures that the Programme is responsive to the needs of the community.

Image 4: Key features of the Swachhata Mitra App

10. Challenges Encountered and Overcome

Whilst there were several challenges, one of the major ones was making the waste value chain attractive. Initially waste collectors used to sell dry waste in 2-3 categories to small scrap vendors, and they in turn used to sell for recycling through intermediaries. Due to lack of secondary sorting, value realisation and resource recycling was low. These scrap vendors were unable to expand their business because of capital and space constraint. They then partnered with Municipal Corporation to run the MRFs developed by Corporation, on long term rental lease. The MRF centres were utilised as a space to store dry waste and undertake secondary sorting for better value realisation. The waste collectors could sell the recyclables in large quantity to the scrap vendors running the MRF aided by a transparent price discovery process.

Due to better value realisation in last 3 years, waste collectors have earned additional INR 88 lakhs from dry waste recycling. **MRFs developed by Corporation have already realised INR12,68 lakhs of rental value from these scrap entrepreneurs.**

What was a challenge in terms of financial attractiveness for the waste value chain players, has now got converted into an impactful design that is aiding to the sustenance of the Programme.

11. Other Information

Saharanpur Municipal Corporation received several recognitions for its Community-Led Decentralised Solid Waste Management Programme including the Prerak Dauur Samman by Ministry of Housing and Urban Affairs, Government of India, 1st Prize for Decentralised Composting at State level by Directorate of Urban Local Bodies, Government of Uttar Pradesh and Covid Innovation Award by Ministry of Housing and Urban Affairs, Government of India.

12. Website/Application Details

ITC Sustainability Report	https://www.itcportal.com/sustainability/sustainabilty-reports.aspx
Swachh Mitra App	https://play.google.com/store/apps/details?id=com.swms.console&pcampaignid=web_share
Learning Management System (LMS) for waste management Programme in Uttar Pradesh	https://cldswm-krc.uskss.com/

Waste Management leveraging Technology for Monitoring in Ganga Grams, Bihar

1. Programme Overview

The Department of Drinking Water and Sanitation (DDWS), Government of India, has identified 1,674 Gram Panchayats (GPs) situated on the bank of River Ganga in Bihar, Jharkhand, Uttarakhand, Uttar Pradesh and West Bengal as Ganga Grams, which included 261 GPs in 12 Districts of Bihar. Government of Bihar aimed to transform these GPs as Open Defecation Free (ODF+) with sustainable sanitation and waste management interventions to contribute to the **Namami Gange** initiative of Swachh Bharat Mission (SBM) of Ministry of Jal Shakti. In February 2022, **Lohiya Swachh Bharat Abhiyan (LSBA)** partnered with ITC for a Programme to address the multifaceted challenges of inadequate sanitation and lack of access to solid and liquid waste management in the villages. The Programme's objective was to create ODF+ model villages that would serve as a benchmark, not only in Bihar, but also across India.

This case study showcases as to how the Ganga Gram Programme's decentralised waste management approach aided by a technological intervention – **Swachhata Mitra Application** (SMA), led to a sustainable impact on waste management including plastic waste management.

2. Relevance

Ganga Grams covering 261 GPs of 12 Districts spread along 450 km of Ganga River were facing pressing waste management challenges, especially **plastic waste, which was about 13% of total waste generated.** The waste if not handled at source, would result in run-off, affecting the aquatic life in Ganga.

Also, effective decision-making at various levels of the Government, from GPs to District and State authorities, required timely and reliable data on the waste that was being generated and how the waste was being managed. The reliance on pen and paper methods of data collection was hindering agility and efficiency, which necessitated a user-friendly tech solution.

Swachhata Mitra Application (SMA) - a digital platform for data collection, tracking, and analysis – was developed by ITC in consultation with LSBA to enable better decision-making and to improve waste management outcomes. SMA helped in enhancing coordination among stakeholders, optimising resource allocation, and promoting community engagement, thereby mitigating environmental and health impacts.

Sri Himanshu Sharma, I.A.S., CEO (Jeevika) cum Mission Director, LSBA, Bihar

"ITC's expertise along with SBM – G/LSBA's intervention helped Bihar in setting a benchmark for efficient waste management, achieving ODF+ model villages in Ganga Gram Districts. The Swachhata Mitra App (SMA) developed by ITC has helped in tracking of waste data and user charge management, ensuring accountability and data driven decision making. Encouraged by its success, Department has decided to scale this application across all Districts of Bihar. The joint work of LSBA & ITC has exemplified effective Public Private Partnership, and I am hopeful that other State Governments will also leverage SMA in the future."

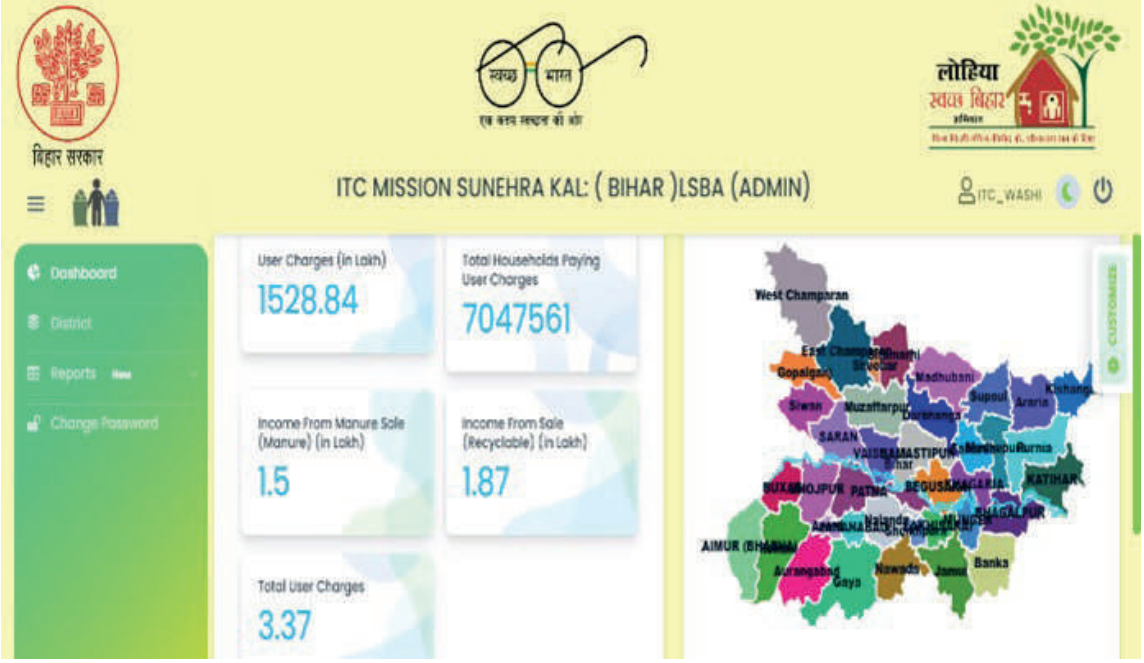
3. Detailed Programme Description

The purpose of the LSBA – ITC partnership was to set up a waste management system that could be implemented and managed by the Panchayats and monitored effectively at various levels of Government to create ODF+ Ganga Grams.

The **Swachhata Mitra Application**, designed and deployed by ITC, serves as the Programme's technological backbone. The objective of the Application was to address the complex waste management needs of Ganga Gram, catering to diverse user needs and facilitating data-driven decision-making at all levels of Government. The SMA is designed to enhance the effectiveness and efficiency of waste management implementation by capturing data through an IT tool with integration of all the transactions undertaken by different actors as their roles, such as:

- Capture data of waste generation and management including plastic, revenue generation from User Fees and sale of recyclables at the point of generation and aggregation.
- Easing access to information and key outcome indicators for different actors to monitor progress and support decision making - Panchayat, Block and State Units of SBM.

Image 1: State Level Dashboard – Data with GIS



Over a period of time, such data captured could be used for analytics and targeted steps to further strengthen the intervention.

SMA has two Modules - **Desktop Module** (Web based) for Admin / Sub-admin and **Mobile Module** (Android based) for Field staff and Supervisor for data entry. There are five user roles with four interfaces for **Maker, Checker, Sub-admin and Admin.**

SMA is just a technology driven enabler for planning and monitoring of decentralised waste management. For making use of SMA meaningfully, there were many other aspects that ensured through training of SBM officials in collaboration with LSBA, who then cascaded it to the Panchayats, which included:

- Decentralisation of waste management with focus on source segregation, composting and User Charge payment by waste generators so that Panchayats can manage it easily and sustainably.
- Deep social engagements with community and community-based organizations like SHGs, which was an essential part of the Programme and included tailormade behaviour change campaigns leading to community ownership.
- Deployment of adequate manpower for waste management and their capacity building.

Decentralized processes and use of SMA in the Ganga Gram initiative ensured waste collection in the 261 GPs covering about **5.2 lakh households**. Households paying User Fees increased from 2,600 in 2022-23 to 1.8 lakhs in 2023-24. Effective monitoring through SMA resulted in an increase in **waste segregation to 70%,** which reduced the waste going to landfills from 100% to **19%.** 197 **Primary Waste Processing Units** were constructed by SBM, after training by ITC, to collect and store recyclable waste, from where recyclable plastic was sold, and unsold plastic sent to 21 **Block level Plastic Waste Management Units.** Till date, **1,292 MTs of plastic** has been collected and managed. The Programme helped convert **411 of the 438 villages in the 261 GPs as ODF+ Model** within a year's time, basis verification from the State Government. SMA played an important role towards achieving the various KPIs linked to ODF+.

This would not have been possible but for the dynamic and exemplary leadership of the then Mission Director, Bihar, and the continued whole-hearted support and engagement of subsequent Mission Director and State LSBA team.

4. Financial/Revenue Model

The financial model of the Programme was consciously designed in a way that it leverages Government funds. The Programme's financial sustenance is ensured through a multifaceted revenue model, leveraging a diverse array of funding streams through strategic partnerships.

- Panchayat wise plan, developed by SBM officials after training by ITC converged funds of the 15th Finance Commission Fund (INR 24 Crs.), Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) Fund (INR 12.5 Crs.), and Swachh Bharat Mission (SBM-G) Fund (INR 232 Crs.) to establish essential infrastructure, **including Waste Processing Units** (WPUs) at village level, **Plastic Waste Management Units** (PWMU) at Block level, soak pits, collection vehicles, and Personal Protective Equipment (PPE) kits for Safai workers.
- The Programme generates revenue through User charge collection with drives like Mera Kachra, Meri Jimmedari, sale of compost manure, and recyclable plastic and metal, fostering a self-sustaining ecosystem and ensure operationalisation of the same. Through SMA, till date, **INR 130.63 lakhs User charge collection and INR 3.27 lakhs from sale of manure and recyclables** have been tracked from 261 Ganga Gram GPs.

ITC has acted as a catalyst by investing in the need assessment, designing of the Programme, creation of IEC modules, capability building of SBM officials, and monitoring and technical support through its partner NGO WASHi. This is in addition to the spends on developing the SMA. ITC has also investment in the overall Programme management and coordination with LSBA.

This convergence of schemes enables optimal resource utilisation, ensuring that funds are allocated effectively. The revenue streams are diversified, reducing dependence on a single source, mitigating financial risks, ensuring long-term viability and sustenance.

Image 2: Waste Processing Unit, Etahari GP, Munger

5. Partnerships

The multistakeholder partnership framework adopted by ITC brought together LSBA from Government of Bihar, ITC, WASHi and Gram Panchayats, leveraging their collective expertise, resources, and networks. ITC served as the techno-managerial support agency, providing critical technical assistance and Programme management expertise. New Concept, a Delhi based agency was engaged for designing behaviour change campaigns and IEC material. WASHi as a partner of ITC, acted as the on-ground agency for training of SBM officials, who in turn trained Panchayat officials. LSBA, the nodal agency of SBM-G in Bihar, ensured policy support, fund flow, coordination, monitoring through District SBM teams, and decision-making, while Gram Panchayats drove field implementation, convergence of funds, and community mobilisation.

Partnership with community and local community-based organisations was a key tenet of ITC's approach. Under this partnership, 3,161 Ward Implementation and Management Committees (WIMC) and 261 Gram Panchayat Implementation Committees (GPIC) were formed, who along with Jeevika Self-Help Groups were trained on waste management with ITC NGO partner in a cascade approach. Harnessing the strengths of multiple partners like Jeevika SHGs, which has a large platform that includes schools and colleges, helped in taking awareness on waste management to household level effectively. Mera Kachra, Meri Jimmedari campaign was implemented for User charge collection and the drive on Swachhta Bhi, Poshan Bhi by involving Asha, Anganwadi Didi and other field functionaries helped in creating awareness on use of household waste water for kitchen gardens.

Graph 1: Partners and their roles in the Programme

LSBA	ITC	WASHI (supported by ITC)	Gram Panchayat
• Policy Support • Fund flow as per Plan • Coordination between Districts & Block • Monitoring	• Techno- managerial support to LSBA • Designing project plan and capacity building plan • Designing behaviour change campaigns • Monitoring and supervision	• Training and capacity buiding of SBM officials. • Support in running behaviour change caimpaigns • Implementation suppotto Block and District officials	• Field • Implementation of decentralised waste management • Convergence of Funds • Driving Behaviour Change

This collaborative approach facilitated knowledge sharing, capacity building, and innovation, driving continuous improvement and Programme scalability. Addressing the complex challenges of waste management in this manner, demonstrates the potential for transformative change in rural India's waste management landscape through people's participation.

6. Programme Amplification

Swachhata Mitra Application is a technology enabler in Ganga Gram, which helped in streamlining plastic and other waste management operations. It facilitated tracking black spots and cleaning of the same, and awareness campaigns promoting behavioural change. Initially SMA was implemented in 12 Ganga Gram Districts, but realising the value it adds, LSBA has now started using the application in other Districts also. LSBA has thus been able to monitor **INR 2,030 lakhs of User Fees** through the SMA.

The decentralised model of waste management implemented in Ganga Gram is highly replicable and ITC has already expanded it to 1,200 GPs across Andhra Pradesh, Karnataka, Punjab, Telangana, Uttar Pradesh, Uttarakhand and West Bengal in collaboration with respective Departments of the States.

ITC has customised the SMA, and its version 2 (v2.0) is currently being tested in select geographies of other States such as Karnataka, Punjab, Uttar Pradesh, Uttarakhand and West Bengal for waste management programmes both in rural and urban geographies.

Department of Drinking Water and Sanitation, Government of India and few other State Swachh Bharat Mission teams have also shown interest in using SMA in the SBM Programme. India Sanitation Coalition has also highlighted the benefits of the application and its potential for replication during various Government meetings and seminars.

7. Information, Education & Communication (IEC) Model

The Programme's IEC strategy identified knowledge gaps through a comprehensive need assessment, which led to the designing of a tailored Swachhata Prashikshan Toolkit on the principal of adult learning to strengthen the infrastructure, operational & financial elements. This Toolkit included Jingles, stories, game-based learning, videos and audios for community engagement and outreach Programmes, and behavioural change.

Further, an innovative IEC tool, **Ganga Rath,** a vehicle with in-built LED screen and audio-visual training content, supported training and awareness of the Safai Mitras (Waste Collectors), Jeevika **Didis** (SHG women) and WIMC members.

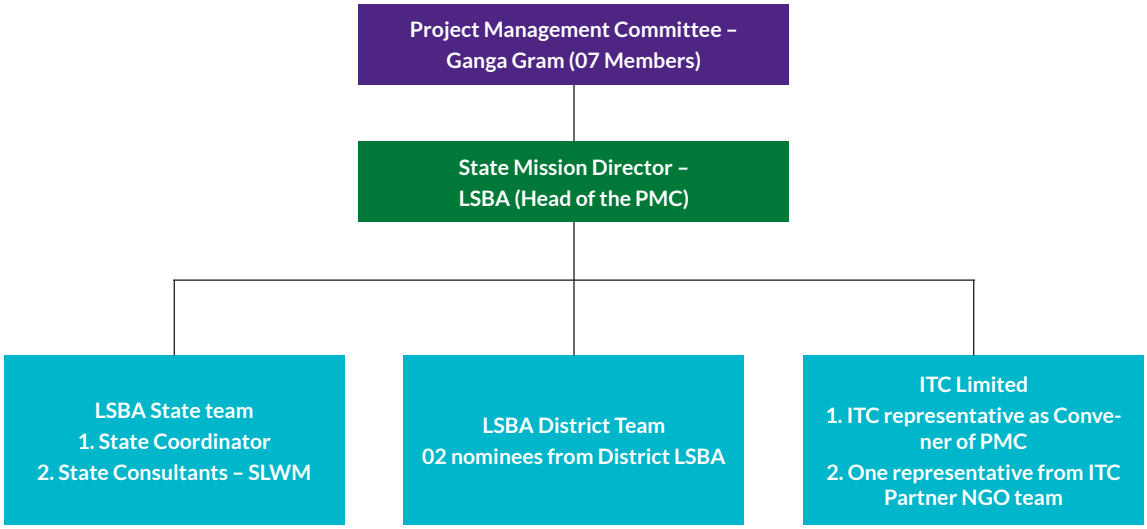
Through Ganga Rath movement in 261 GPs, 44,115 households were reached with Alag Karo Campaign, in addition to **12,000 children** in 242 schools and **10,566 SHGs** who were trained on waste management. Additionally, **1.3 lakh citizens** participated in **1,741 legacy waste removal campaigns** and cleanliness drives that were monitored through SMA.

Behaviour change was also required for moving away from pen and paper to Swachhata Mitra Application for data collection and monitoring. This was ensured through implementation in few GPs first and then engaging those Panchayat functionaries as influencers with other GPs. This along with LSBA pushing for review based on SMA dashboard, helped in quick adoption of the Application.

Image 3: Ganga Rath Training at village level

8. Programme Monitoring and Evaluation

In Ganga Gram Programme, a Project Management Committee (PMC) was created to review the progress of the deliverables with members from LSBA, ITC and District Functionaries. Structure of the PMC is given below:



The PMC reviewed the key performance indicators (KPIs) in real-time, ensuring data-driven decision-making and Programme optimisation.

SMA facilitated informed decision making by providing role-based access, customisable dashboards, and advanced analytics capabilities, including automated report generation, geo-spatial mapping, and alerts for performance deviations across hierarchy. With adaptive architecture and seamless scalability, Swachhata Mitra Application enabled Programme administrators, implementing agencies, and community leaders to monitor critical metrics, identify areas for improvement, and optimise resource allocation. Like any other system, SMA too needed data checking to ensure integrity of the same before inputting. LSBA ensured reviewing of progress in Districts and GPs through SMA and also kept hard copy of records.

Image 4: CEO Dashboard: Data Visualisation and Analytics

9. Challenges Encountered and Overcome

The Ganga Gram Programme navigated following challenges:

Initially, knowledge gaps among stakeholders hindered effective waste management practices. To address this, a **360-degree training need assessment** study was conducted and capacity-building undertaken, enhancing the skills of **86,500 village level functionaries including Jeevika SHG members** and other frontline workers.

Financial constraints of Panchayats for infrastructure were resolved by leveraging resources from the 15th Finance Commission, MGNREGS and SBM-G. Capacity building gaps in infrastructure development were filled through partnerships with technical agencies.

The transition to SMA required substantial training and handholding, as the shift from paper-based system was difficult, especially at the Panchayat level. At least 6 months of guidance was needed to ensure operational readiness. Additionally, active involvement of District and State SBM team was essential to ensure accurate, timely data entry and regular using of SMA for decision making. Continuous monitoring by leadership made SMA operational and impactful across different regions.

Whilst Government is keen on every household paying User Fees, ensuring the same is taking time. This will require more concerted effort to explain the purpose to all critical stakeholders and influencers at local level.

10. Other Information

As part of 75th Independence Day Celebrations, 75 Gram Panchayats were identified across India to be converted as Light Houses. The initiative was a collaboration between DDWS, State Govts. and Corporates, orchestrated by **FICCI-India Sanitation Coalition**. 36 GPs were undertaken by ITC across 8 States. In Bihar, ITC identified 8 GPs from Ganga Gram Programme. **All 8 GPs were converted as Light Houses in 2023-24 and Bihar became the only State then to achieve 100% success.** This achievement was appreciated and LSBA was felicitated during the FICCI-ISC Sanitation Conclave held in December 2023.

Department of Drinking Water and Sanitation, Ministry of Jal Shakti, Govt of India published a compendium of best practices titled "**Voices from the States**" in 2023. **Ganga Swachhata Rath** was covered as one of the best practices in the compendium.

11. Website/Application Details

Cascade Training Approach	https://youtu.be/-Rqd7O759n0?si=xB_OQxtt9CMKJJ1f
Introduction video on Ganga Gram Programme	https://youtu.be/W2wIrzgazrw?si=cx8dYtO-Lg4WDZeD
Liquid Waste Management (video 1)	https://youtu.be/8odIWUMOOQY?si=pXKd6EOYCzhaamkb
Liquid Waste Management (video 2)	https://youtu.be/0Wxq8f2sNvU?si=JVWVvi481pL5SfeJ
Dialogue between two Mukhiya's on Swachh Gram Samridh Gram 22 April 2022	https://youtu.be/qykIKAJdkMI?si=ESxQcDvHENLhr9Ym
Solid Waste Management Gamification	https://youtu.be/_nTViOCCFJo?si=voLBfagPnKI__fWG
Plastic Waste Management	https://youtu.be/rCkojxUZQn4?si=eDrfV2zCFXzfHDKL

12. Testimonials of Users of SMA

Mr. Pradeep Kumar, District Coordinator - LSBA (District - Buxar)

"The Swachhata Mitra Application has promoted citizen participation, recording over 1,000 reports in early 2023, leading to swift action on sanitation issues. The collective efforts of ITC and WASH Institute have significantly improved cleanliness and hygiene standards in the region, empowering local communities and instilling a sense of pride and responsibility among residents. Thank you, ITC Ltd and WASH Institute, for your unwavering dedication and exemplary technical support."

Mr. Rakesh Kumar Rai, Sanitation Supervisor (GP - Kamarpur, District - Buxar)

"Role of Swachhata Mitra Application for the purpose of data tracking on daily waste collection and user fees from households, has been invaluable. The guidance of ITC and its partner WASHi in helping me map and get Waste Processing Units constructed in my Gram Panchayat has significantly improved our waste management practices. My work has been recognised and appreciated within the District, and I attribute my success to their unwavering support and commitment to my professional development."

INDIA SANITATION COALITION

7.2

HCL Foundation

Samuday: Community Mobilization

1. Programme Overview

HCL has been working on the Samuday Intervention for waste management under the WASH vertical the past four years. While the broader community-focused efforts under WASH began in 2020, the specific plastic waste management programmes for Urban Local Bodies were initiated in April 2023. The Foundation, through its initiative Samuday, intends to develop a sustainable, scalable, and replicable model for rural areas/ semi urban areas of Hardoi District, Uttar Pradesh in partnership with ULBs (Urban Local Bodies), GP (Gram Panchayats), local communities, NGOs, knowledge institutions and allied partners.

Under the programme, an integrated solid waste management plan was developed with the cooperation of the local bodies, an interactive approach, all stakeholders trained towards 5Rs (Refuse, Reduce, Reuse Repurpose, Recycle) of waste, sustainable practices and circular economy are promoted and facilitated. The programme emphasizes capacity building, waste collection and processing, entrepreneurial collaboration, and regular monitoring to ensure the programme's success and sustainability. The programme specifically focusses to strengthen the existing Government system and ensuring the community participation through various awareness generation activities to develop a sustainable model.

2. Relevance

Waste is a serious threat to public health and cleanliness in rural areas / semi urban areas. Though the form of waste generated in rural areas is mostly organic and biodegradable, it has become a major problem to the overall sustainability of ecological balance due to its improper disposal and management.

The intervention targets the critical issue of waste management at various scales. Globally, plastic pollution is a monumental threat, impacting marine life, wildlife, and human health. Nationally, particularly in countries like India, the surge of waste from both urban and rural sectors challenges existing infrastructures. Urban areas face overwhelming volumes of waste, whereas rural regions struggle with inadequate waste management systems, leading to environmental degradation. At the district and city levels, rapid urbanization and population growth intensify waste production, often surpassing the capabilities of local disposal systems.

Communities lack segregated waste collection, proper infrastructure for a functional waste management system resulting in increased pollution and health hazards. Without a functional waste collection and disposal system at the Municipality level, it is arbitrary to hold individual households responsible or blame them for irresponsibility. The intervention focuses on establishing sustainable practices, including waste segregation, recycling, and composting, to address these issues comprehensively and protect environmental and public health.

Objectives

The objective of the programme was to develop a sustainable, scalable and replicable model:

To improve/Strengthen the capacity of ULBs (Urban Local Bodies and GP (Gram Panchayat) – Building the capacity of administrative officials of ULBs (Urban Local Bodies) and PRI (Panchayati Raj Institution) members.

Generating Awareness amongst citizens: To Foster a culture of responsibility towards waste management among citizens by conducting campaigns for source segregation, reduction of plastic usage and promoting 5Rs of waste management.

Creating a Functional Circular Economy: To create a self-sustaining waste management process that contributes to economic growth.

Improved Aesthetics: Transform public spaces into visually appealing areas that enhance community well-being.

3. Detailed Programme Description

ULBs (Urban Local Bodies and GP (Gram Panchayat) in the Hardoi district of Uttar Pradesh, is implementing an innovative waste management programme led by HCL Foundation. This initiative leverages an integrated solid waste management approach to foster a circular economy through source segregation, waste minimization, and recycling efforts. Currently, the programme operates in select wards of Sandila, with plans for expansion contingent upon successful outcomes.

The programme's strategy revolves around enhancing waste management efficiency via improved door-to-door collection, facilitated by route mapping, continuous capacity building, and a robust monitoring mechanism. Biodegradable waste collected is transformed into compost, while plastic waste is recycled at the Material Recovery Facility (MRF) Centre in Sandila. A First fully functional MRF centre has been set up in Hardoi district. By adopting these practices, the programme not only reduces landfill waste but also contributes to environmental sustainability.

At the heart of the programme are community-based organizations (CBOs) known as **Swachhta Samiti Groups**. Each group comprises 30-40 members from the respective wards, who gather monthly to review progress and facilitate discussions on behaviour change communication and sanitation activities, composting techniques, MRF operations, and monitoring processes. These groups play a crucial role in mobilizing households to segregate waste effectively and adopt home composting practices. Their involvement ensures community engagement and participation, vital for the programme's success.

Figure 1: Programme Strategy and Plastic Waste Management

The process begins with waste collectors segregating and transporting biodegradable waste to decentralized ward-level composting units and non-biodegradable waste to the MRF Centre. At the MRFs, recyclables and plastics are meticulously sorted by trained sorters. The sorted plastic waste is then baled and dispatched to recyclers. This systematic approach ensures that both biodegradable and plastic waste are managed efficiently, adhering to circular economy principles, thereby minimizing the waste that ends up in landfills or dumpsites.

Through this comprehensive waste management programme, Hardoi is setting a precedent for other regions to follow. By integrating community involvement with advanced waste management techniques, the programme not only addresses the immediate waste management challenges but also promotes long-term environmental sustainability. The success of this initiative could serve as a model for similar programmes across India, where waste management remains a critical issue.

Moreover, the programme's emphasis on education and capacity building is instrumental in fostering a culture of sustainability. By equipping community members with the knowledge and tools needed to manage waste effectively, the programme empowers individuals to take initiative and contribute to a cleaner environment. This empowerment is crucial for driving behavioural change and ensuring the programme's long-term viability.

Image 1: On-field implementation

The waste management programme in Hardoi, spearheaded by HCL Foundation, exemplifies how an integrated approach combining community engagement, technological innovation, and sustainable practices can effectively address waste management challenges. As the programme evolves and expands, its impact will likely extend beyond Sandila, inspiring other regions to adopt similar models and contribute to a more sustainable future.

Programme Achievements so far:

The programme has achieved impressive results in various areas, including:

Household Waste Segregation: With over 74% of the 4,312 households now segregating waste, the initiative has made significant progress in promoting responsible waste management practices within just one year.

Bulk Waste Generators and In-situ Composting: The project has encouraged bulk waste generators to start in-situ composting, which reduces the amount of waste going to landfills, helping to address long-term waste disposal issues.

Beautification and Public Awareness: The beautification of 28,000 sq ft of walls and the creation of 45 waste-to-art installations have contributed to raising public awareness about upcycling and waste management.

Garbage Vulnerable Points: Out of 3,436 identified garbage vulnerable points, 100% have been completely eliminated, demonstrating the effectiveness of the cleanup efforts.

Image 2: Mass Cleanliness Drive

Livelihood and Social Security for Waste Collectors: The programme supports 58 green friends (Safai Karamchari) who earn a steady income of INR 12,500 per month. Moreover, their social well-being is safeguarded through bank accounts and insurance coverage, ensuring long-term security for them and their dependents.

Mass Cleanliness Drive: A mass cleanliness drive focuses on removing Garbage vulnerable points (GPs) and cleaning drains and roads with community participation under GPWSC (Gram Panchayat Water and Sanitation Committee) guidance. 496 mass cleanliness drive has been conducted in the village, which has been used in the agricultural field as a manure.

Composting at Household Level: 14,446 households have adopted composting method, and the programme has produced 10,158,234 kg of compost produced at the household level. Composting is a process for handling organic residuals, it represents a better approach for organic waste management. Composting is an excellent and viable option for the treatment of organic waste. It was designed in such a way that the waste workers don't need to touch the garbage.

Customized E-Garbage Loaders: 43 e-loaders were provided to ULBs for door-to-door collection of waste. These battery-powered carts are designed to be environmentally friendly and suitable for semi-urban and rural areas, easily navigating narrow and short roads. The loaders operate on the principle of ensuring no household is left out, covering all household in the area.

This initiative is not only improving waste management but also contributing to social welfare and environmental conservation.

4. Smart Solution

The programme in Sandila clearly prioritizes the well-being and safety of its "green friends" (waste collectors) while also fostering community involvement and awareness, especially among the youth. Some key aspects include:

Focus on Hygienic and Safer Working Environment: Significant attention has been given to creating a safe and hygienic environment for green friends (Safai Karamchari). Multiple training sessions have been conducted to equip them with the skills needed to handle various types of waste, ensuring their safety and efficiency.

Customized Drain Carts: To minimize the manual handling of waste, especially in wet conditions, the programme introduced customized drain carts with sieves. These carts allow excess water to drain out, making waste collection less burdensome and more sanitary for the workers.

"Learning by Doing" Approach: The programme has implemented an educational component through plastic waste collection drives in schools. This hands-on approach engages students directly, instilling in them the principles of a circular economy and encouraging them to take an active role in waste management.

Community Driven Programmes: The programme, supported by HCLF, regularly recognizes and rewards local citizens for their efforts in minimizing plastic waste and adopting source segregation practices. This not only motivates continued participation but also builds a sense of community around the shared goal of improving waste management.

Image 3: Glimpse of recognition that the campaign received

Nagar Palika Parishad Sandila
16 Apr ·

HCL फाउंडेशन के सहयोग से सेंटर फॉर डेवलपमेंट कम्युनिकेशन सस्थां CDC, ने नगर पालिका परिषद संडीला के साथ मिलकर सफाई साथियों के लिए कपड़ा अपशिष्ट प्रबंधन के साथ अपशिष्ट, डी2डी संग्रह, स्रोत पृथक्करण और अपशिष्ट प्रबंधन पर एक कार्यशाला का आयोजन किया गया

इस कार्यशाला के अंतर्गत हमारे द्वारा सफ़ाई साथियों के लिए कचरे की मूल बातें, कचरे के प्रकार और कचरे को अलग करने के तरीके के बारे में जानकारी साझा की गई
विशेष रूप से इस कार्यशाला में कपड़ा अपशिष्ट प्रबंधन के बारे में जानकारी प्रदान की गई । इस कार्यशाला में नगर पालिका परिषद की ओर से अधिशाषी अधिकारी विजेता गुप्ता, सेनेटरी इंस्पेक्टर राज मंगल सिंह और जिला परियोजना प्रबंधक पुष्पेंद्र जी और सीडीसी से परियोजना प्रबंधक शिवम रावत इंपैक्ट ऑफिसर अली आदि ने मिलकर मार्गदर्शन किया।
ULB code-800927
Swachh Uttar Pradesh - SBM, URBAN

+3

विश्व पर्यावरण दिवस के अवसर पर नगर पालिका अध्यक्ष रईस अंसारी ने वृक्षारोपण किया

नगर पालिका, सीडीसी, एचसीएल फाउंडेशन द्वारा मेगा इवेंट आयोजित

स्पर्श भारत न्यूज ब्यूरो हरदोई
सण्डीला। सेंटर फॉर डेवलपमेंट कम्युनिकेशन ट्रस्ट, एचसीएल फाउंडेशन और नगर पालिका परिषद के सहयोग से नगर के पाँच वार्ड में एकीकृत ठोस और तरल कचरा प्रबंधन परियोजना पर काम कर रहा है। जिसके सफल प्रथम वर्ष के उपलक्ष में जूनियर हाईस्कूल में एक अयोजन किया गया जिसमे वार्ड के सदस्य छात्र छात्राओ ने भाग लिया।
आईआर कॉलेज के छात्राओं ने नुक्कड़ नाटक और एक डांस के माध्यम से समुदाय में जागरूकता हेतु कचरे के ऊपर एक वीडियो भी दिखाया गया।
पौधरोपण किया गया।सीडीसी संस्था के द्वारा किए जा रहे सराहनीय कार्य के लिए मुख्य अतिथि मो० रईस अंसारी ने टीम को बधाई दी और नागरिकों से अपील करते हुए कहा की सभी वार्ड के वासी कचरे को अलग-अलग सूखा और गीला करके दें और कूड़ा रोड, गली व खाली प्लाट पर ना फेंके ताकि नगर को और भी स्वच्छ और निर्मल बनाया जा सके।
इस अवसर पर मुख्य अतिथि नगर पालिका परिषद के अध्यक्ष रईस अंसारी व अधिशासी अधिकारी श्रीमती विजेता गुप्ता,सफाई व खाद्य निरीक्षक राज मंगल सिंह के अलावा पालिका परिषद के सदस्य व एचसीएल फाउंडेशन टीम से विवेक तिवारी, सीडीसी की टीम के शिवम रावत और आली हसन,आरिफ, यासमीन बानो निखिल पटेल सुजल आदि उपस्थित रहे।

मेरा वार्ड साफ हो , इसमें सबका साथ

3G49+VGJ, Lucknow Rd, Sumbabag, Tiloiya, Sandila, Makhadum Pura, Uttar Pradesh 241204, India
Latitude 27.057149182073772° Longitude 80.51875658333302°
Local 10:15:37 AM GMT 04:45:37 AM Altitude 133 meters Saturday, 06.01.2024

74 likes
sbm_up Ongoing Beautification work in Sandila, Hardoi. More than 16000 sqft has been painted over the past 2 months in Sandila, with a plan to paint 12000 sqft additionally. The work is being undertaken by HCL Foundation and Centre For Development Communication Trust (CDC) under its "Swachh Nagar Paryojana"- Integrated Solid Waste Management

sbm_up

58

Liked by cdcindiaofficial and others

sbm_up Under the Swachh Nagar Pariyojana for Sandila by HCL Foundation and Centre for Development Communication - Our dedicated team members have pledged this Plastic Free July to give up single-use plastics and contribute to making Sandila Nagar Palika clean and green making a huge contribution in sustainability.

#saynotoplastic #plasticfreeup

July 20

Beniganj Sandila Marg, Shuba Baug, Sandila, 241204, UP, India
Latitude 27.0615° N Longitude 80.5123° E

86 likes
sbm_up SWACHH CHAMPIONS

HCL Foundation and Centre For Development Communication (CDC) under its Swachh Nagar Paryojana initiative in Sandila, hosted an energetic World Soil Day event at Bhagwan Buddha Inter College with 100 school children. The program focused on management of wet waste, how to make compost, and ended with some thematic waste management games.

#SwachhataHiSeva2023

Following is the list of Social Experiments conducted to sensitize the community:

- **Household level Plastic Holding Initiative:**

  HCL Foundation, through its programme Samuday, has introduced an innovative approach to plastic waste management for rural households in Sandila, Hardoi district. The programme focuses on raising awareness and educating the community about managing plastic waste and the harmful effects of plastic use, including threats to wildlife, damage to ecosystem, human health risks and waste management challenges.

  Under this initiative, households are trained to directly participate in plastic waste management. They are encouraged to keep a dedicated bag for storing plastic waste. Once filled, the Safai Karamcharis (sanitation workers) collect these bags and transport them to the Material Recovery Facility (MRF) for processing. 10,671 households are covered in 11 blocks of Hardoi district and 35,589 kg of quantum of waste has been managed at household level. This initiative not only reduces plastic waste but also promotes sustainable practices within the community.

- **Installation of Benches from Recycled Plastic:**

  Benches made from recycled plastic have been installed in community areas, serving as both functional seating and a statement on the importance of transforming waste into valuable resources. These installations aim to raise awareness of the "waste to wealth" concept while enhancing the community's aesthetic environment.

- **Installation of Waste-to-Art in the Community:**

  The community has embraced the concept of waste-to-art by installing various creative pieces made from upcycled materials such as tires, old cardboard, and bottles. These installations serve a dual purpose: raising awareness about transforming waste into valuable resources and enhancing the area's aesthetic appeal.

  These initiatives reflect a holistic approach to waste management that not only addresses environmental concerns but also prioritizes the health, safety, and empowerment of the community members involved.

5. Financial/"Revenue" Model

The HCL Foundation's initiative in Hardoi is a comprehensive effort not only in its execution but also in its planning for long-term sustainability. Here are some additional insights:

- **Comprehensive Funding Approach:** The programme's funding covers a wide range of activities, from human resources and tools to awareness campaigns and the operation of the Material Recovery Facility (MRF) centre. To ensure thorough and well-supported implementation of these activities, HCL Foundation encourages and guides government institutions towards disbursing the required funds for waste management work.

- **Sustainability Efforts:** To ensure the long-term viability of the programme, HCL Foundation is actively working on making the MRF centre self-sustainable. This involves training and workshops for Community-Based Organizations (CBOs) to build local capacity and ensure the programme's ongoing success.

- **User Charge Discussions:** The exploration of a User charge for waste generators is a forward-thinking step. By engaging with authorities on this, the programme is looking to create a financial model that can support on going waste management activities while encouraging responsible waste disposal practices among residents.

This multi-faceted approach highlights the programme's focus on both immediate impact and long-term sustainability, ensuring that the benefits of the initiative continue well into the future.

6. Partnerships

HCL Foundation, through its project implementation partner, has conceptualized and developed the project with support from representatives of ULBs (Urban Local Bodies) and Gram Panchayats (GPs). Additionally, HCL Foundation partnered with organizations like the Centre for Development Communication Trust that provide expertise and able to bring operational efficiency to the programme. With HCL Foundation providing the financial backing and technical guidance, and the Centre for Development Communication Trust handling the day-to-day operations, the programme benefits from both strategic oversight and on-ground execution.

The programme engages in a collaborative, participatory, dignified, and inclusive manner. Support is received from the District Magistrate, executive officers and representatives from the Swachh Bharat Mission in Hardoi, and from the Sandila Nagar Palika leading to improved programme implementation and alignment to local governance structures. This cross collaboration is key to the Samuday Programme success and sustainability.

7. Programme Amplification

HCL Foundation's strategy to amplify the programme by extending it to other Urban Local Bodies (ULBs) in the Hardoi and other districts is a significant step towards broader regional impact. By establishing model wards, the Foundation not only showcases the success of their approach but also creates a practical learning platform for other ULBs. This could lead to the adoption of effective waste management practices across districts, amplifying the programme's benefits and fostering a culture of sustainability.

8. Information, Education & Communication (IEC) Model for the Programme

The Samuday programme focuses on community mobilisation as an effective and sustainable strategy towards waste management. It employed various IEC campaigns to achieve its goals towards solid waste management at the village community level.

A wide range of options can be adopted for implementing awareness campaigns for community mobilisation. At the village level, options may include Participatory Learning and Action (PLA) tools, pictorial printed material for widespread communication, Inter-Personal Communication (IPC) at the grassroots level, capacity-building sessions, and door-to-door contact.

The IEC campaign for Samuday programme specifically focused on generating awareness on source segregation, reducing the single-use plastic and upcycling of the waste. The campaigns included:

- Thematic game-based awareness in public places
- Har Ghar Dastak for awareness on source segregation
- Demonstration of the waste segregation process
- Distribution of cloth bags for reducing the usage of plastic
- Wall beautification and waste to art installation
- Conducting cleanliness drives, flash mobs on regular intervals
- Formation of Swachh Sarathi Club

9. Programme Monitoring and Evaluation

To ensure the programme's effectiveness and sustainability, a comprehensive monitoring and evaluation framework has been established. This includes regular data collection on waste management practices, community participation, and environmental impact. Key performance indicators (KPIs) are tracked to assess the progress of waste segregation, recycling rates, and reduction in waste sent to landfills.

Quarterly reviews are conducted with stakeholders, including local authorities, community-based organizations, and green friends, to discuss challenges and identify areas for improvement. Feedback mechanisms are in place to incorporate insights from community members and programme participants, ensuring that the programme remains responsive to local needs.

The evaluation process also involves measuring the social and economic benefits of the programme, such as job creation for green friends and the enhancement of public spaces. By continuously monitoring these aspects, the programme aims to achieve long-term success and serve as a replicable model for other regions facing similar waste management challenges.

10. Challenges Encountered and Overcome

Initially, the programme faced significant resistance from the community, as many members believed that waste management was solely the responsibility of the civic body. This mindset posed a considerable challenge, as the success of the waste management model relied heavily on community ownership and participation. To address this, the programme implemented extensive Information, Education, and Communication (IEC) campaigns aimed at raising awareness about the direct and indirect benefits of the programme. These efforts were crucial in shifting community attitudes and encouraging individuals to take an active role in waste management.

Another challenge arose with the collection of household waste. In the beginning, many households were reluctant to provide their waste to the collection vehicles, let alone segregate it. This led to widespread dumping of waste in open areas, undermining the programme's objectives. To overcome this, regular campaigns were conducted to identify households that were not participating in waste collection. These households were then educated on the importance of proper waste disposal. Once waste collection became more consistent, the programme focused on educating citizens about the segregation process through demonstrations, gradually improving compliance.

The programme also encountered difficulties in operationalizing the Material Recovery Facility (MRF) centre. Hardoi did not have a fully functional MRF until the previous year, which complicated efforts to process and recycle waste. Initially, recyclers were reluctant to accept the waste due to its poor quality. To resolve this, the programme worked closely with recyclers to improve the quality of the waste by thoroughly air-blowing it multiple times, making it more acceptable for recycling. Establishing strong ties with recyclers in the region was essential to achieving the circularity needed for the programme's long-term success.

Image 4: On-field implementation

7.3

Trashify

Trashify Web Application

1. Programme Overview

Trashify Tech, launched in May 2022, is a startup incorporated in Estonia and India that specializes in enhancing waste management processes. Using AI-powered computer vision, Trashify offers a sophisticated waste analytics platform designed to provide waste management professionals with data-driven insights about their waste streams. These insights enable them to streamline operations and optimize sorting accuracy, thereby improving recycling rates through enhanced understanding and management of their waste. The platform targets a diverse group of stakeholders within the waste management industry, including facility operators, producer responsibility organizations, and recycling companies.

2. Relevance

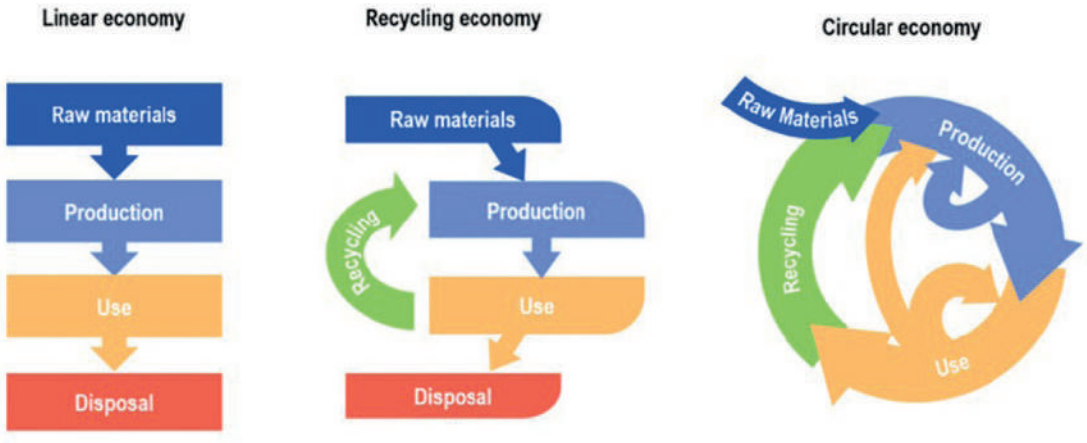
Waste management facilities often depend on manually collated data to manage their waste streams effectively. This data is crucial for various operational decisions, including reporting, financial planning, and workforce management. Many facilities are also hindered by outdated technology, which impairs their ability to comply with recycling and sustainability regulations. Furthermore, manual data collation is labour-intensive, costly, and prone to inaccuracies, leading to improper sorting of waste and other operational inefficiencies. Trashify aims to transform this scenario by empowering facilities to make informed, data-driven decisions about all of their operations. This shift is essential for progressing towards a more sustainable and resource-efficient future.

3. Detailed Programme Description

Trashify's initiative is meticulously designed to tackle significant challenges in the waste management sector, focusing on increasing efficiency and sustainability across global operations. The programme employs cutting-edge AI, utilizing machine learning and computer vision to dramatically improve the accuracy of waste data (which also includes differentiating between different types of plastics), which can then also enable facilities to improve their waste sorting rates. This is not just an enhancement of current practices but a transformative approach to how waste is managed, making it a pivotal solution for environmental sustainability.

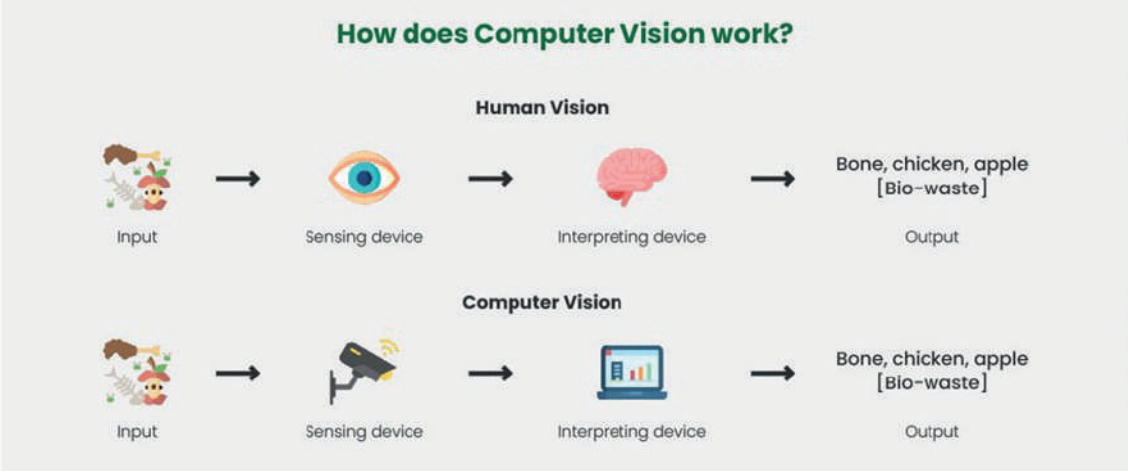
Programme Objectives:

The primary purpose of Trashify's programme is to digitize waste management systems worldwide, enabling them to handle waste more effectively. By integrating AI-driven technologies, facilities can boost their operational efficiencies, decrease reliance on landfills, and adhere more closely to stringent environmental regulations. The programme also aims to empower waste management facilities with actionable data, allowing for optimized decisions that can lead to significant cost savings and reduced environmental impact.



Programme Design:

The core of Trashify's solution lies in its AI modules, which are installed directly above the conveyor belts within waste management facilities. These modules are equipped with cameras that scan the waste as it passes through the sorting line. Utilizing computer vision, the system identifies and categorizes different types of waste, detecting and identifying them according to material typologies. At this point, these systems can identify 50 different types of waste, including 17 different types of plastics.



Geographical Coverage:

With ongoing paid pilot programmes in key European cities known for progressive waste management policies, the programme's design allows for scalability and adaptability to various regulatory and environmental contexts. Trashify plans to expand its reach across Europe and Asia, targeting organizations that are grappling with the dual challenges of growing waste volumes and stringent environmental targets.

Implementation Process:

Installation and Setup: The installation process involves retrofitting the devices over existing sorting lines, a procedure designed to be minimally invasive and easily integrable. Moving forward, Trashify aims to eliminate the need for any specialized hardware, making the solution much more scalable by making it hardware-agnostic.

Staff Training: Users receive comprehensive training on navigating the system's dashboard, understanding data outputs, and making informed decisions based on real-time analytics.

Operational Integration: The system seamlessly integrates with the facility's existing waste management protocols, enhancing rather than replacing current processes.

Continuous Monitoring and Adjustment: Trashify provides ongoing support and updates, ensuring that the system adapts to changing operational needs.

Impact of the Programme:

Environmental Impact: Facilities equipped with Trashify's technology are projected to have up to a 20% reduction in landfill waste and a corresponding increase in recycling outputs, directly contributing to environmental sustainability goals.

Operational Efficiency: The automation of waste data collation and subsequent decisions reduces labour costs and increases process efficiency, allowing facilities to allocate resources more effectively.

Regulatory Compliance: Enhanced accuracy in waste sorting helps facilities meet compliance requirements more reliably, avoiding potential fines and penalties.

Amendments During Implementation:

User Interface Improvements: Simplifying the dashboard interface to ensure user-friendliness for multiple waste management stakeholders – plant managers, producer responsibility organizations, municipalities, etc.

Algorithm Refinement: Adjusting the AI to better recognize and sort a broader range of waste materials, particularly those specific to varying regional characteristics.

Trashify's approach not only redefines waste management practices but also serves as a model for integrating advanced technology into traditional industries, paving the way for smarter, more sustainable operations worldwide.

Image 1: Digitizing waste sorting for optimum segregation

4. Smart Solution

Technology Used:

Computer Vision: Trashify's system incorporates high-resolution cameras that continuously scan waste streams. This technology captures detailed images of waste materials, which can then be analyzed in real-time. The Trashify proprietary software is capable of distinguishing between different types of waste materials and various types of packaging waste, surpassing the accuracy of traditional visual sorting by human workers.

Machine Learning Algorithms: The heart of Trashify's technology is a set of sophisticated machine learning algorithms. These are trained on vast datasets of waste images, allowing the system to improve over time. This dynamic learning capability is a significant advancement over static technologies commonly used in waste management. In addition to that, Trashify's newly launched 'DIY-AI' solution provides complete autonomy to the user over the entire system, enabling them to create their own waste detection models, which they can also leverage to fine-tune and enhance their waste detection models with data of their choosing.

Data Analytics Dashboard: Trashify's comprehensive waste analytics platform enables waste management facility employees to get more robust insights on their waste streams, including material composition, potential contaminants, revenue generation capacity, carbon impact, etc. The dashboard also facilitates data-driven decision-making, allowing changes to optimize sorting efficiency.

Image 2: AI based sorting of waste on conveyor belt using machine learning

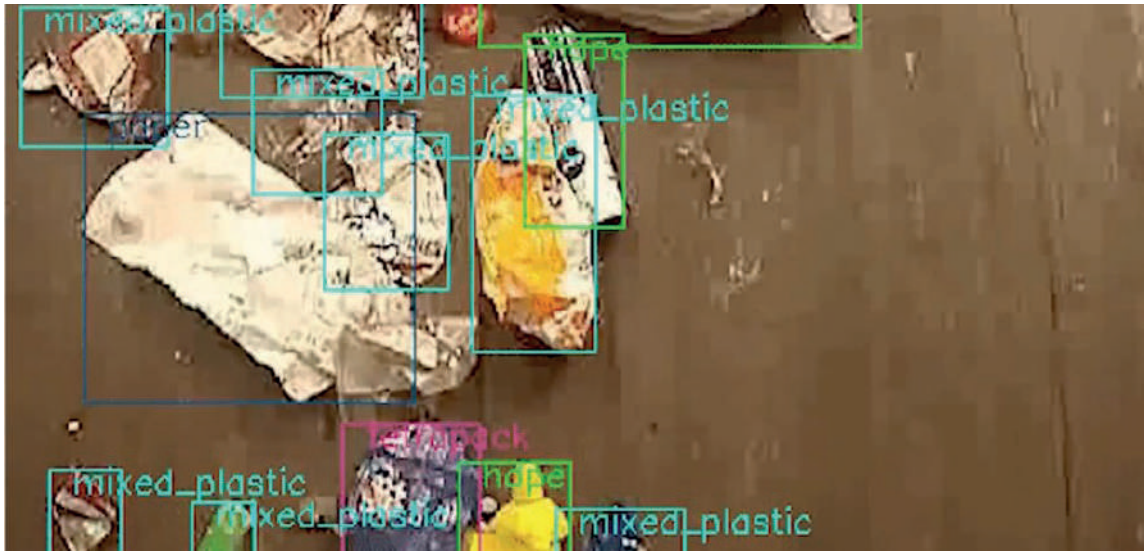


Image 3: Waste sorting conveyor belt

Expected Outcomes and Benefits:

Increased Recycling Rates: By improving sorting accuracy, more materials can be correctly recycled, reducing contamination and increasing the volume of recyclable materials.

Reduced Operational Costs: Automation of certain processes reduces reliance on manual labour, which can be costly and less efficient.

Enhanced Compliance: Better sorting leads to higher compliance with regulatory standards for waste management, avoiding fines and improving public relations.

Environmental Impact: By diverting more waste from landfills and reducing the need for new materials from natural resources, Trashify's system significantly lessens the environmental footprint of waste management operations.

These innovative approaches position Trashify at the forefront of smart waste management solutions, offering substantial improvements over traditional methods and delivering clear environmental and economic benefits.

5. Financial/Revenue Model

Revenue Streams:

Subscription Fees: Trashify operates on a subscription-based model, where clients pay a monthly fee to use Trashify systems. This fee includes access to the hardware (AI-enabled devices), software (machine learning algorithms and data analytics dashboard), and ongoing customer support.

Licensing: For larger corporate clients or municipal systems, Trashify can offer a licensing option, allowing them to integrate Trashify technology within their existing waste management solutions for a monthly fee, plus an annual maintenance charge.

Model Sustainability:

The sustainability of Trashify's financial model hinges on its subscription-based revenue structure, which ensures a steady inflow of funds to cover operational and maintenance costs. Economies of scale are achieved as more clients adopt the system, reducing per-unit costs and improving overall profitability. Future O&M costs are projected to be stable due to the high durability and low maintenance requirements of the AI hardware, coupled with automated software updates and client-controlled data management and enhancement that keep the system optimised without significant additional costs.

This model not only provides Trashify with a sustainable financial framework but also ensures that clients receive continuous value from their investment, fostering long-term partnerships and steady revenue growth.

6. Partnerships

Trashify has strategically partnered with several key stakeholders to enhance the implementation, scaling, and effectiveness of its AI-driven waste management solutions. These partnerships play crucial roles in expanding Trashify's reach, improving technology, and ensuring operational excellence:

a) **Waste Management Facilities:** As Trashify's primary partners, these facilities are the end users of Trashify technology. They implement the Trashify system on their sorting lines and provide valuable feedback that informs ongoing product development and optimization. Their role is vital for real-world deployment and scaling of the technology across different regions and waste types. So far, Trashify solutions have been deployed in facilities handling municipal solid waste and mixed packaging waste.

b) **Technology Providers:** Trashify is looking to collaborate with leading technology firms specialising in recycling technologies. This collaboration ensures that Trashify remains at the cutting edge of technological advancements, while also providing Trashify with a revenue stream to keep operations ongoing.

c) **Government and Regulatory Bodies:** Partnering with municipal and national government agencies helps align Trashify's solutions with regulatory standards and gain necessary certifications. These partnerships also facilitate entry into new markets by ensuring compliance with local waste management regulations.

d) **Academic Institutions:** Universities and research centres provide Trashify access to the latest research in waste management and recycling technologies. These partnerships contribute to Trashify R&D efforts, offering academic insights that help refine Trashify models and introduce innovative features.

e) **Environmental NGOs:** Collaborations with environmental organisations help promote sustainability practices and increase awareness of the benefits of advanced waste management solutions. These partnerships also provide a platform for Trashify to engage with community initiatives and contribute to broader environmental goals.

f) **Investors and Financial Institutions:** Financial backers are crucial for scaling operations, supporting Trashify expansion into new markets, and funding continuous improvement of Trashify technologies. These partners will provide the capital necessary for large-scale deployments and further development.

Through these collaborative efforts, Trashify is able to leverage a wide range of expertise, resources, and networks to enhance its offerings and scale the initiative effectively. Each partnership is strategically chosen to contribute to the overall success and impact of Trashify, ensuring that Trashify team can deliver high-performance waste management solutions globally.

7. Programme Amplification

Trashify's AI-driven technology features a modular design that facilitates seamless integration with existing waste management infrastructures, reducing both the complexity and cost of setup. This flexibility ensures that the Trashify system can be effectively implemented across various operational settings, from small municipal operations to large industrial complexes, without the need for significant modifications. Specifically, Trashify's 'DIY-AI' system empowers facilities to fully manage their waste detection systems and independently integrate new types of waste streams. This capability allows Trashify to handle specialised waste types such as construction and demolition (C&D) waste, textile waste, and electronic waste, thereby broadening Trashify's reach across multiple waste-intensive industries. Additionally, as the Trashify technology evolves, it can be adapted to new applications, including contaminant detection and sorting rate calculations, further enhancing its utility and scalability.

For future sustainability, Trashify focuses on continuous improvement through software updates and algorithm refinements, which enhance system performance and adaptability to new industries. Additionally, partnerships with technology providers, regulatory bodies, and educational institutions ensure that Trashify remains at the forefront of waste management innovation, driving long-term viability and impact.

8. Information, Education & Communication (IEC) Model for the Programme

Trashify's system is also aimed at fostering awareness and behavioural change in waste management practices. The model leverages a mix of digital platforms and partnerships with educational institutions and environmental NGOs.

Digital Engagement: Trashify utilizes social media, webinars, and its website to disseminate information about the benefits of proper waste sorting and the environmental impacts of landfill use. Educational videos and infographics simplify complex concepts for the general public.

Partnerships: The data provided by Trashify systems can help waste management companies use it to spread awareness about waste management practices at the community level.

These initiatives have been designed to engage communities directly, enhance understanding of sustainable waste practices, and motivate changes in behaviour that support improved waste management systems.

9. Programme Monitoring and Evaluation

The Trashify framework includes both quantitative and qualitative metrics to assess performance, identify areas for improvement, and facilitate timely course corrections.

Quantitative Metrics: Trashify aims to track key performance indicators (KPIs) such as waste sorting accuracy, revenue increase and time saved in automated waste data collation. Data from these metrics is analysed to ensure operational efficiency and effectiveness.

Qualitative Assessments: Feedback from users and stakeholders is gathered through interviews and regular review meetings. This qualitative data provides insights into user satisfaction, operational challenges, and potential areas for technology enhancement.

10. Challenges Encountered and Overcome

Financial Obstacles: Securing sufficient funding, especially investment, has been challenging for Trashify, especially when funds have been needed to grow the team so that Trashify can start scaling its operations. Overcoming this required Trashify to have strategic partnerships with investors and leverage grants aimed at sustainability projects to demonstrate the long-term cost benefits and environmental impact reductions that the Trashify system offers.

Sociopolitical Factors: Gaining acceptance and buy-in from local authorities and waste management facilities can lead to long sales cycles. Different regions have varying regulations and priorities regarding waste management. To address this, Trashify engagement strategies aligned with local policies and demonstrated how its technology could help facilities meet stringent regulatory requirements, thereby fostering greater cooperation and adoption.

Geographical Challenges: Implementing Trashify technology in diverse geographical areas (across Europe and in future, Asia) with differing waste management infrastructures and practices required adaptable system configurations. This is particularly significant because it involves customising Trashify platform to operate reliably under various environmental conditions.

Overcoming these challenges has been remains crucial for establishing Trashify as a reliable and adaptable solution in the global waste management industry.

11. Website/Application Details

Demo link	https://drive.google.com/file/d/1GjTpbkAWn9ajzhSGqOKRoOohSmgNqnqO/view?usp=sharing

7.4

Grant Thornton

Swachh School Swachh Shehar Campaign

1. Programme Overview

Swachh School Swachh Shehar' campaign is a collaborative initiative led by **Guwahati Municipal Corporation**, which is being implemented by **Akshar Foundation** to promote responsible waste management practices by students in schools. The campaign focuses on instilling a culture of cleanliness among school student and promoting sanitation and hygiene awareness within Guwahati.

The programme began with a six-month pilot in **10 schools, in line with the National Education Policy, 2020. Following the pilot's success, the programme scaled to 20 schools and has a long-term vision to reach 100 schools.** Activities include the establishment of eco-clubs that engage students in hands-on practices such as zero-waste management, composting, organic gardening, tree planting, and plastic recycling. Students trained in these eco-clubs are certified as Young Swachhata Ambassadors and tasked with spreading awareness and encouraging sustainable waste practices in their schools, homes, and communities.

2. Relevance

The project aimed to address following challenges related to waste at ULB level:

a) **Poor waste Management and segregation:** Many schools lack effective systems for waste segregation and disposal. Unsegregated waste leads to increased pollution, overflowing landfills and environmental degradation. This campaign promotes waste segregation at households, teaching students and residents to segregate waste.

b) **Lack of hygiene and sanitation practices:** Inadequate awareness about proper hygiene practices, especially in schools, contribute to health risks such as the spread of diseases. By instilling hygiene habits in children and promoting community awareness, the campaign aims to reduce disease transmission and improved health.

c) **Behavioural issues with Cleanliness:** Lack of awareness and careless behaviour towards cleanliness, especially the habit of littering, dumping waste in public areas, and not taking responsibility for community spaces. This campaign focuses on changing behavioural attitudes towards cleanliness through education, participation and community driven activities. By starting with children in schools and extending to families and communities, it hopes to create a long-term culture of cleanliness and help in developing responsible consumption and waste management behaviours

3. Detailed Programme Description

The initiative revolves around the establishment of *eco-clubs* in each Swachh School. These eco-clubs engage in a variety of hands-on activities designed to build environmental awareness and promote sustainable habits**:**

a) **Zero Waste Management:** Schools aim to achieve zero waste by implementing segregation of waste at source, reducing overall waste generation, and promoting recycling.

b) **Composting:** Students learn to compost organic waste, which is then used in organic gardening projects within the school premises.

c) **Plastic Recycling Workshops:** Workshops focus on educating students and their communities about plastic waste reduction, the importance of recycling, and alternatives to single-use plastics.

d) **Organic Gardening:** Schools create organic gardens where students apply compost to grow plants and vegetables, teaching them about sustainable farming practices.

e) **Tree Planting:** Regular tree-planting drives are conducted to promote greenery and environmental stewardship.

Role of Young Swachhata Ambassadors

The eco-club members, once certified as *Young Swachhata Ambassadors*, serve as leaders in spreading the message of cleanliness and sustainability. These student ambassadors are tasked with encouraging waste segregation, composting, and plastic recycling in their households and local businesses, expanding the impact of the campaign beyond the school boundaries.

4. Smart Solution

- **Infrastructure Development:** Installation of **colorful sorting bins, accompanied by comprehensive training sessions to educate students on waste segregation practices.**
- **Waste Management Systems: Weekly collection of plastic, glass, and paper waste, facilitated by Akshar's recycling van.** The collected waste is sent to designated recycling centers in Guwahati.
- **Socio-Economic Empowerment:** Upliftment of marginalized communities targeted through **part-time employment opportunities, educational incentives such as extra marks and prizes for underprivileged students aged around 18-22 years.**
- **Community Engagement: Engagement of neighbors, communities, and ambassadors through pledges for responsible plastic usage and waste management**.
- **Incentivizing schools:** Encouragement for schools through reward and recognition mechanisms such as green certificates to schools.


Single-use Plastic waste
Shredded
New Products
Precious Plastic Workshop
Heater and Press
Plastic shredder
Product mold
Machine designs from Precious Plastic in the Netherlands

He uses this sheet press to make panels from bottle caps and plastic bags. Panels are used for making furniture.

Students help sell these products to make some income. Thus, **Education, Environment, Entrepreneurship, and Employability** are addressed at the same time.

5. Financial/Revenue Model

A critical aspect of GT's contribution is the development of a sustainable revenue generation model through plastic waste collection and processing. By establishing a system where the plastic waste collected by schools is sold to recycling units, the campaign not only reduces plastic pollution but also creates a self-sustaining source of income.

This revenue can be reinvested into the schools to support further environmental projects, ensuring the long-term viability of the campaign. Additionally, partnerships with local stakeholders ensure cost-effective logistics and streamlined recycling processes. The model strengthens the financial sustainability of the initiative while promoting a circular economy.

6. Partnerships

GT Bharat actively supports the Guwahati Municipal Corporation (GMC) in scaling up the Swachh School Swachh Shehar campaign by expanding the number of participating schools and the programme's overall environmental impact. This collaboration aims to enhance the campaign's effectiveness by incorporating strategic planning and sustainable practices.

The campaign, which initially launched with a six-month pilot involving 10 schools, has successfully expanded to 20 schools across Guwahati. This marks a significant step in scaling the programme, with a vision to eventually reach 100 schools in the future. With GT's expertise, the initiative aims to establish more eco-clubs, promoting waste management practices and fostering eco-conscious behavior among students. These eco-clubs will engage students in activities such as zero-waste management, composting, plastic recycling, and tree planting, transforming the schools into models of sustainability.

GT Bharat is also focusing on improving the campaign's operational efficiency, optimizing resource allocation, and ensuring that all schools are adequately equipped. By measuring progress and certifying more students as Young Swachhata Ambassadors, the campaign aims to create a larger network of youth leaders driving community-wide environmental action.

7. Programme Amplification

The programme amplifies its impact by empowering students as Young Swachhata Ambassadors, who champion waste management practices in schools and communities. Eco-clubs lead the way by organizing activities such as waste segregation drives, composting, and recycling workshops. Recognizing schools with green certificates further incentivizes participation and creates role models for sustainability.

- **Culture of circularity and innovation at the city level:** By instilling sustainable practices within school environments, the campaign significantly **contributes to building a long-term culture in the city of Guwahati, focused on adoption of circular practices at the household level.** Further, new plastic products made from recycling waste such as flower planters, dog bowls, key chains etc. are also being brought back for the purpose of demonstration in schools. Through such initiatives around **zero waste management, and plastic recycling,** participating schools emerge as champions of eco-consciousness, fostering a culture of environmental stewardship among students and their respective families residing in Guwahati.
- **Education and Awareness:** Through comprehensive training sessions, educational incentives, and community outreach initiatives, the campaign promotes awareness and education on environmental sustainability. By empowering students as **Young Swachhata Ambassadors,** the initiative fosters a sense of responsibility and ownership towards managing waste at household level.
- **Opportunities for underprivileged students:** Recycling Centre and Collection Van will also provide part-time employment to under-privileged students aged around 18 to 22 years for the activities undertaken for the implementation of the project. The students are also encouraged to pursue their education simultaneously as well.

8. Information, Education & Communication (IEC) Model

Community engagement was a central component of the programme, aimed at fostering long-term awareness and behavior change in waste management. The initiative centered around establishing eco-clubs in schools, where students were empowered to become Young Swachhata Ambassadors. These ambassadors played a key role in spreading awareness through peer education, school-wide campaigns, and community outreach activities. The programme also engaged local communities by involving businesses, households, and neighborhood groups in sustainable practices, such as waste segregation and composting. Additionally, the project incentivized participation by recognizing schools and students with green certificates for their contributions to the campaign. Through these efforts, the programme successfully built a culture of sustainability that extended beyond the schools and into the wider community.

9. Challenges Encountered and Overcome

- **Lack of Awareness and Engagement**: Initially, there was limited awareness and engagement from students, teachers, and the broader community regarding waste management practices. **This challenge was overcome by establishing eco-clubs and empowering students** as Young Swachhata Ambassadors. Through these clubs, students received comprehensive training and participated in community outreach programmes, which significantly increased engagement and awareness about sustainable waste management practices.
- **Infrastructure Limitations**: The project faced infrastructure challenges, such as a shortage of sorting bins and limited composting facilities. **This was addressed by installing colorful sorting bins and introducing shredders and molding machines**, which facilitated more efficient waste segregation and recycling. Regular collection of waste such as plastic, glass, and paper was also organized to ensure smooth operations.
- **Community Participation**: A key challenge was low participation from local businesses and households, which limited the campaign's impact beyond schools. **The project tackled this by fostering community engagement through various initiatives**, including recognizing schools and students with green certificates and involving neighboring communities and local ambassadors. This encouraged broader participation, helping extend the campaign's impact across Guwahati.

10. Website/Application Details

Website	https://www.aksharfoundation.org/

7.5

WASTE

FINILOOP

1. Programme Overview

Based on more than 40 years of expertise in solid waste management and long-standing relationships with local partners in India, WASTE developed the FINILOOP plastic waste free cities programme. FINILOOP (Financial Inclusion and Improved Livelihoods out of Plastic) started in 2022 and is currently active in three cities in India. It aims to improve solid waste management systems, enhance livelihoods in the plastic waste value chain, create cleaner communities, and foster innovation. WASTE facilitates the establishment of sustainable solid waste management systems using the multi-stakeholder diamond approach. In this way WASTE ensures sustainable growth that will last long after the end of the project/programme.

2. Relevance

FINILOOP addresses the interlinked problems of lack of solid waste management systems and the deplorable living and working conditions of informal waste workers.

In India, mismanaged plastic waste is an important part of overall municipal waste management problems in cities. Due to rapid urbanization and economic development, the amount of urban solid waste continues to increase, and the plastic waste fraction is growing even faster. Nowadays, this can make up more than 10% of the total waste. Indian cities struggle to implement a financially sustainable and effective waste management system. As a result, plastic waste is mostly dumped in the open, littered or burnt causing local environmental and health issues or entering waterways and eventually polluting the oceans.

In addition, informal waste workers are heavily affected by the negative impacts of poorly managed waste. They often live and work in very poor conditions and struggle to earn a decent living income from waste materials.

3. Detailed Programme Description

FINILOOP is active in Udaipur, Amritsar and Jaipur and started with a thorough assessment of plastic and solid waste management systems in these cities. This included using the UN Habitat Waste Wide Cities Tool to obtain characterization data of solid waste on household and commercial establishments level, surveys of the informal waste worker community and a landscape mapping of the start-up enabling environment in India.

Based on this data an intervention strategy was designed for every actor in the plastic waste value chain:

1. Informal Waste Workers

Informal waste workers (IWWs) play a key role in plastic waste management – they collect plastic waste and sell it on to aggregators. Unfortunately, they are undervalued, struggle to earn a decent living and face dangerous working conditions. FINILOOP is changing this by building trust with the IWW community, improving working conditions, and providing skills training and access to vital services, such as healthcare.

So far, 60 IWWs have received alternative livelihood training, 206 women have had financial literacy training and 166 children of IWWs are now able to access education. Additionally, 1,512 workers have received health check-ups and 482 now have identification cards. Additionally, FINILOOP has created a total of 308 direct and indirect jobs with both service chain and value chain of plastic waste management in Udaipur and Amritsar.

2. Existing enterprises

FINILOOP provides business development support to existing plastic waste enterprises including aggregators, apex traders and recyclers. This includes bridging technical and environmental knowledge gaps, providing access to funding, raising awareness of government schemes and fostering key partnerships.

20 existing enterprises have received business development support since the programme started. As a result, enterprises can increase their capacity to recycle plastic waste, ensuring less plastic waste ends up polluting the environment.

Image 1: Training of Informal Waste Workers

3. Start-ups

To foster innovation and drive positive change, FINILOOP provides mentorship to start-ups that are catalysing solutions to difficult to recycle plastic waste, as well as start-ups working with alternatives to plastics and overall city-level waste management challenges. The FINILOOP Plastic Lab currently supports 16 plastic waste start-ups.

4. Communities

One crucial step is at the household level to encourage communities to separate waste at the source. FINILOOP is facilitating plastic collection systems in schools, community clean-up events, and door-to door separation at source campaigns.

Since the start of the programme, nearly 95,096 households and 12,225 non-household establishments have been reached and 135 local Mohalla community committees have been formed to help clean up local areas. 5,893 people have, thus far, attended the Mohalla committee meetings.

4. Smart Solution

In the FINILOOP approach several methods are used to attract innovations in the plastic waste management system in the cities:

1. To foster innovation and drive positive change, FINILOOP is providing mentorship to start-ups that are catalysing solutions to recycle difficult-to-recycle-plastic waste, that are working with alternatives to plastics, and that are addressing overall city-level waste management challenges.
2. Awareness raising and behaviour change activities to convince households and non-household establishments to separate mixed waste at source is crucial to obtain higher quantities of high-quality plastic waste. Next to the conventional door-to-door visits by community mobilizers, FINILOOP also empowers communities by setting up local Mohalla Committees. In addition to this, an innovative approach to educate residents of the three cities, hotels, restaurants, temples, and informal waste workers is the usage of tutorials (instruction videos) that can be shown on mobile phones:
    a) How to separate waste at home?
    b) How to separate waste at commercial establishments?
    c) How to sort and add value to plastic waste?
    d) How to store and pack plastic waste?

Image 2: Business development coaching & awareness raising on segregation at source

5. Financial/Revenue Model

FINILOOP specifically focuses on strengthening entrepreneurship. For example, FINILOOP supports local micro entrepreneurs with formalization including linkages to financing opportunities. This leads to an increase in investments in essential equipment, machinery and working capital, livelihood opportunities and employment and a higher percentage of recycled secondary raw materials. FINILOOP has also facilitated the setting up of increased storage space for sorted material, which allows for better negotiation positions of the IWWs and the micro entrepreneurs. Furthermore, innovative start-ups involved to fill the gaps in the plastic waste value chain, also receive support in revenue and costs assessment, as well as preparation in accessibility to funding opportunities.

6. Partnerships

FINILOOP India is in partnership with:

WASTE: is an international organisation specialised in three key areas (i) sanitation and faecal sludge management, (ii) solid waste management, including plastics recycling, and (iii) innovative financing, in low- and middle-income countries. WASTE is committed to creating cleaner, healthier futures for all and drives sustainable system-led change by bringing together stakeholders from across sectors to pilot, upscale and deliver innovative programmes. Their mission is to initiate, strengthen, and scale waste management solutions which help communities to become healthier, contribute to greater social inclusion, and protect the environment.

AspireLabs: a consulting firm working in the Start-up Acceleration domain with a special focus on Clean Tech Plastic Recycling and Waste Management and Renewables since 2018 and responsible for the mentoring and incubation activities to support start-ups in the three cities.

TOP (Trust of People): TOPs mission is to improve access to health, education, social welfare and basic essential services through human-centric, rights-based approach. TOPs vision is to impact quality of life inclusively and equitably. TOP is responsible for the on-ground implementation of FINILOOP activities in the three cities regarding awareness raising, clean up events, stakeholder engagement, and capacity building of the informal waste worker community.

FINILOOP is implemented in close collaboration with the Urban Local Bodies of the cities it works in. This cooperation is formalised with an MOU. Next to this, FINILOOP reaches out to relevant stakeholders in the cities such as start-up incubation centres, financing institutions, local banks, and brands depending on the needs of the programme. All to ensure the sustainability of the various activities undertaken.

7. Programme Amplification

FINILOOP strengthens existing plastic waste management systems and connects stakeholders in the service and value chain both within each city and the recycling industry operating at regional level. Ownership is with local partners and governments, and FINILOOP focuses on strengthening the enabling environment including preparing enterprises in their access to financial institutions and embedding the initiatives in municipal waste policy and legal documents. The FINILOOP model is gaining momentum in India and is ready to be replicated in other cities and states in India.

8. Information, Education & Communication (IEC) Model

The community engagement initiatives undertaken by the FINILOOP team are aimed at promoting separation at source and cleaner communities through awareness raising and behaviour change. These activities encompass a range of strategies, including community meetings, home composting initiatives, Garbage Vulnerable Point (GVP) cleaning drives, door-to-door visits, establishing plastic banks in schools, organising rallies, and facilitating plays.

Community mobilisers have been actively engaging with a broad spectrum of entities to advance waste management practices across Udaipur and Amritsar. Specifically, they have reached out to 95,096 households and 12,225 non-household entities, such as schools, Anganwadi centres, and commercial establishments. These engagements have focused on promoting effective waste separation at source, encouraging home composting, reducing plastic usage, and ensuring timely payment of user fees. Furthermore 61 plastic banks have been established at schools, and 80 GVPs have been cleaned and16 beautified.

9. Programme Monitoring and Evaluation

In FINILOOP the following M&E activities have taken place:

- Use of the Theory of Change approach to outline a systematic process to plan according to the desired outcomes.
- The use of a M&E framework based on the expected impact and objectives established in the Theory of Change.
- The definition of indicators (especially Key Performance Indicators- or KPI's) with measurable, achievable, realistic and time-bounded (SMART) characteristics.

- Baseline studies and surveys to understand the current state of the problem, including data related to beneficiaries and key stakeholder activities.
- Identification of information gaps, on- field capacities and available resources.
- Establishment of responsibilities and roles for data collection and programmatic reporting among partners.
- Use of a Data Management System that facilitates the reporting, collection, analysis and visualization of monitoring data and eases evaluation.
- Use of evaluation results for better decision making.

10. Challenges Encountered and Overcome

During programme implementation, FINILOOP faced the following main challenges:

1. Frequent transfer of government officials and the reluctance of administrative authorities and public representatives. To address this, FINILOOP identified officials who are committed and not transferred frequently. FINILOOP also works with public representatives who are open to work to set an example for others.
2. Gaining trust with FINILOOP beneficiaries, namely informal waste workers, in the beginning was not easy. The IWWs were not open to share information and to connect with the programme. FINILOOP started building trust by organising several events from cricket matches to marathon run ups, to health camps, and financial skill training. This supported in winning the confidence of IWWs in the programme who are now very much committed to be involved.
3. Lack of an effective fee collection system for solid waste and limited access to registration of incoming and outgoing financial streams were other challenges that FINILOOP encountered. Non-registration was specifically hindering the development of effective and viable business plans that could be presented by enterprises to financial institutions for funding. These issues were addressed through intensive coaching sessions and trust building exercises.

11. Website/Application Details

Website	https://www.waste.nl/finiloop
Tutorial: How to Separate Waste at Home	https://www.youtube.com/watch?v=qtU3XgzenDE
Tutorial: How to Separate Waste at Commercial Establishments	https://www.youtube.com/watch?v=4xHm6KG2zfU
Tutorial: How to Sort and Add Value to Plastic Waste	https://www.youtube.com/watch?v=_x2PFscdNvM
Tutorial: How to Store and Pack Plastic Waste	https://www.youtube.com/watch?v=8DYdQi8Gjj4

7.6

Grant Thornton

Techno-Market Analysis on Multi-Layered Plastic

1. Programme Overview

Multi-Layered Plastic (MLP) has become one of the most widely used plastic packaging materials globally. The massive generation of MLP waste can be attributed to rapid urbanization, increase in retail operations as well as its versatility as a packaging material for consumer goods viz. grocery, food items, vegetable products, cosmetics, and consumer items. MLP recycling poses various challenges like low economic value of MLP, limited market linkages for MLP recycled products and policy support.

Recognizing the challenges of MLP recycling, GT Bharat was contracted by the "Waste Solutions for a Circular Economy in India" project implemented by GIZ India and funded by the Mitigation Action Facility, to conduct a techno-market analysis for MLP recycling in India. The study had the following objectives:

- Analysing the current landscape of MLP recycling in India including technology, market players, government guidelines, and current and best practice.
- Gap assessment of currently available technologies and future requirements.
- Providing inputs for developing standards and guidelines for MLP recycling
- Providing recommendations and suggestions for promoting MLP recycling.

The study covered five clusters: Ahmedabad, Pune, Kanpur, Indore, and Delhi/NCR.

2. Relevance

The project aimed to address following challenges related to MLP recycling in India:

a) **Limited market linkages of end-products:** Current recycling technologies for MLP waste in the domestic market face challenges in achieving high-quality recycled materials, which limits the suitability for wider end-use applications, including food packaging etc. MLP waste is typically 'downcycled' to create low grade pellets as inputs for recycled plastic manufacturing, which limits the quality of recycled products further.

b) **Limited prevalence of viable business models:** The economic viability of MLP recycling business models has been a challenge in Indian cities due to the factors such as initial investment costs for setting-up recycling facilities, operational expenses, and limited end-use market demand for recycled MLP materials. Additionally, the limited policy support to promote MLP collection, segregation and processing and market-based incentives for MLP recycling further limits investment.

3. Detailed Programme Description

The study on techno market analysis of MLP Recycling consisted of four focus areas:

Policy gap analysis: Analysis of current landscape of MLP recycling in India by examining the policy instruments relevant to MLP waste management including Plastic Waste Management (PWM) rules, Single Use Plastic (SUP) ban and Extended Producer Responsibility (EPR) guidelines. Assess the effectiveness and impact of the existing framework on MLP recycling market.

Technology assessment: Gap assessment of MLP recycling technologies, identifying innovative practices around MLP waste value chain, and mapping best practices for improving technologies of MLP recycling in India.

Identification of viable business models: Financial modelling analysis of MLP recycling facilities and recommendations to promote and scale up MLP recycling. Evaluated demand and supply factors of MLP waste value chain and key market trends to identify feasible business models.

Formulation of draft guidelines and actionable policy recommendations: Inputs for developing standards/ guidelines for setting up sustainable MLP recycling practices through stakeholder consultations.

As part of the project, analytical frameworks were developed for assessing the feasibility of MLP recycling in India. Key activities undertaken were as follows:

Stakeholder mapping: A wide range of stakeholders: Producers, Importers, and Brand Owners (PIBOs), waste aggregators, MLP recyclers and other relevant stakeholders were identified for stakeholder consultation.

Primary Research: Research tools for interviews and site visits were developed for conducting key informant interviews with stakeholders and questionnaire-based surveys with MLP recycling units and aggregators

Desktop review: A holistic list of policies, guidelines, standards, SOPs and case studies related to MLP recycling in India were desk reviewed. A policy assessment framework was developed for structured assessment.

Field visit: Site visits were conducted covering the recycling plants to understand their challenges and business model. Basis site visits key insights and recommendations on improving MLP recycling process were identified.

4. Smart Solution

Innovative methods and techniques used in the programme were development of frameworks for gap assessment.

- Development of technology assessment framework to conduct assessment of available MLP recycling and innovative technologies focusing on 3R principles of Reduce, Reuse and Recycle: eco-design, reduced MLP use, MLP alternatives etc. Basis the assessment a '**scoring matrix**' was developed for comparison of technologies in conjunction with the qualitative assessment.
- Business Model assessment framework was developed to assess the MLP recycling business models on different parameters such as implementation, feasibility, acceptability of end products, ease of doing business, impact on environment, social and economic development.
- Policy assessment framework was developed to assess more than 22 policy instruments based on REEIS criteria: Relevance, Effectiveness, Efficiency, Impact and Sustainability. The framework helped to assess the policies to understand the impact on MLP waste ecosystem.

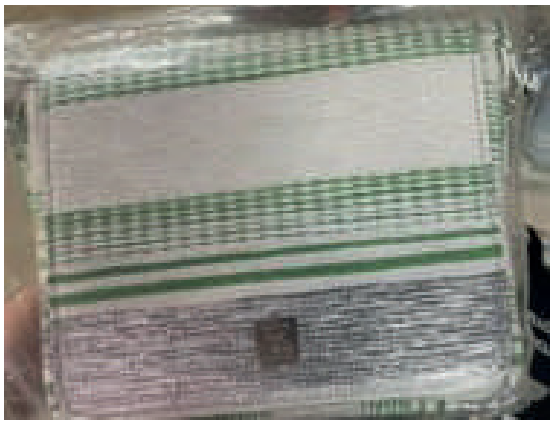
5. Partnerships

As part of the project, GT Bharat partnered with GIZ India to serve as technical experts for a comprehensive study on Multi-Layered Plastic (MLP) recycling in India. This collaboration aimed to explore the techno-market landscape of MLP recycling, focusing on engaging key stakeholders to drive sustainable solutions. Through consultations with pollution control boards, relevant government ministries, private sector actors such as PIBOs, and both formal and informal waste workers, the project facilitated critical linkages. The partnerships developed during the study can play a pivotal role in creating a unified approach towards developing standards and guidelines that can significantly enhance India's MLP recycling infrastructure.

6. Programme Amplification

- 12 MLP Recyclers and Aggregators from 5 geographies visited and assessed
- 50 plus stakeholders consulted
- 22 policy instruments analysed




IPCA



7. Challenges Encountered and Overcome

- One of the key challenges encountered during the study was **limited standardized regulations and certifications for recycled MLP products**, which created uncertainty in the market and reduced buyer confidence. **To overcome this, the study actively engaged with stakeholders**, including policymakers and standards organizations, to advocate for the establishment of clear quality benchmarks such as BIS certifications.
- **Another challenge was the constantly evolving plastic landscape**, with the introduction of new plastic types making it difficult for existing MLP recycling technologies to keep pace. **This issue can be addressed by recommending a focus on standardizing MLP product types** to simplify recycling processes and encourage the development of more adaptable technologies.
- **By facilitating dialogues between private sector stakeholders and ULBs**, the project was able to create more streamlined processes and build partnerships to enhance MLP recycling efforts.
- **Lastly, the complex approval processes for necessary clearances** such as **Consent to Establish (CTE)** and **Consent to Operate (CTO) were mitigated by providing a roadmap for navigating these processes**, simplifying regulatory hurdles across different states.

7.7

GIZ

RACE Campaign

1. Programme Overview

On July 1st, 2022, the Government of India announced a ban on single-use plastics (SUPs) under the Plastic Waste Management (Amendment) Rules, 2021. The ban prohibits the manufacturing, import, distribution, sale and use of identified SUPs like straws, cups, cutlery items, etc. with low utility and high littering potential.

To support this initiative, the Government of Uttar Pradesh is implementing various plastic waste management initiatives, focused on circular economy approaches to reduce plastic pollution in the state. To achieve this, the Department of Environment, Forest and Climate Change (DoEFCC) and the Urban Development Department, Government of Uttar Pradesh collaborated with the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH under the Indo-German development cooperation project "Circular Economy Solutions Preventing Marine Litter in Ecosystems (CES)" (visit the project webpage at Driving forward the reduction of marine litter in the Indian Ocean - giz.de) to organise the mega "**RACE (Reduction, Awareness, Circular (Solutions), Mass (Engagement) Campaign** for SUP-free Uttar Pradesh". This initiative aimed to address the growing concern of plastic pollution and promote environment-friendly lifestyles.

Image 1: Customised Products made by Exhibitors for RACE 3.0 (left to right: Substitute to Flower Bouquet wrapped in recycled paper post cards made of paper with seeds in it, a invitation letter/farman made of biodegradable material, Prasad boxes

The RACE Campaign is an annual joint action organised by DoEFCC, GIZ India and other key stakeholders from past three years, starting from 2022. On 29 June 2022, the first phase of the mega one-week campaign concluded on 3rd July with the Uttar Pradesh Plastic Waste Management Conclave 2022 and a Technology Exhibition showcasing single-use plastic alternatives at the Indira Gandhi Pratishthan, Lucknow. On the occasion of the World Environment Day, RACE 2.0 was organised in Gorakhpur on 05 June 2023. This was followed by "RACE 3.0 SUP-free Ayodhya" which was held on 09 January 2024.

2. Relevance

Plastic waste leakages into riverine and marine ecosystems are both global and national issues. Since its inception, plastic commodities have fostered a culture of use and throw, with their growing consumption and improper disposal being major causes of plastic litter in natural ecosystems. In recent decades, the world has witnessed serious social, environmental, and economic implications due to the improper scientific disposal of plastic waste. A fundamental change is necessary in the way plastic products, including packaging, are designed, used, and disposed of, with a focus on responsible waste management—not only among consumers but also producers of plastics.

The objective of the RACE Campaign is to create awareness on circular economy with special focus at plastic waste management through multi-stakeholder partnerships in the public and private sector. This includes government stakeholders, sustainability managers and leaders, industry experts, Producers, Importers and Brand Owners (PIBOs), and Plastic Waste Processors (PWPs). The first phase of the campaign brought together key representatives from the Central and State Government along with 734 Urban Local Bodies (ULBs), research and academic institutes, industry experts, entrepreneurs, start-ups, Resident Welfare Associations (RWAs), Non-Governmental Organisations (NGOs), youth groups and civil society organisations.

Key stakeholders are the Department of Environment, Forest and Climate Change and the Urban Development Department, Urban Local Bodies, the State Pollution Control Board and technical institutes.

Overall, the campaign activities were organised in a manner to address the gaps and leakages in the plastic value chain by promoting environment friendly lifestyles and sustainable plastic waste management systems to mitigate plastic pollution in the state. The campaign also supports Mission LiFE that envisions replacing the 'use-and-dispose' economy with a circular economy and addressing this through state-level interventions that contribute to the national vision.

3. Detailed Programme Description

Race 1.0: Year 2022

An action plan was jointly developed by DoEFCC and the Urban Development Department, Government of Uttar Pradesh, and GIZ India. The week-long RACE Campaign schedule was created under two sections: Planning and Monitoring, and Implementation

Multi-Stakeholder Consultations and Preparatory Meetings: Extensive planning meetings and multi-stakeholder consultations were held with government officials, urban local bodies (ULBs), and other key stakeholders to mobilise mass citizen engagement and implement the campaign on-ground.

Technical Workshops: Consultation Workshops were organised to highlight the importance of implementing the Extended Producer Responsibility (EPR) framework for plastic packaging and exploring sustainable alternatives to SUPs.

Plastic Waste Management Conclave: The event provided a platform for identifying synergies and promoting technological solutions for closing gaps in the plastic value chain by facilitating multi-stakeholders' consultations.

Plastic-Free Zones and Upcycling Workshops: Based on the 3 R's (Reduce, Reuse, Recycle), upcycling workshops were conducted for the general public to foster awareness on sustainable alternatives by creating practical items from discarded plastics. This was later displayed at a unique "Eco-Mela". Plastic Banks, Jhola Bank and Bartan Banks were installed to enhance awareness among the citizens on alternatives to plastics for prohibited SUPs in the state.

Awareness and Engagement: Five mega plogging drives and mass ghat (Ganges) clean-up drives were held at three major cities, namely, Lucknow, Prayagraj and Varanasi. In addition, plogging drives were facilitated in other cities and towns.

Social media campaign: To increase the outreach of the week-long campaign, social media handles of the RACE Campaign were created on LinkedIn, X (Twitter) and Instagram. Over 500+ social media posts were published on all handles to promote pre- and post-campaign activities. A unique hashtag #RACE4SUPFreeUP was created as part of the campaign branding and promotional activities through social media. On 03 July 2022, it was trending at second position in India on platform X and ended at the fifth position by the end of the day.

Cleanliness Drives: Plastic waste was collected via mass plastic donation and clean-up drives at some of the common plastic pollution hotspots such as transport hubs, railway stations, mandis and markets. Three major cities were picked to organise mega plogging drives and mass ghat (Ganges) cleaning drives - Lucknow, Prayagraj and Varanasi. In comparison, all other cities and towns contributed with local plogging drives.

RACE 2.0: Year 2023

A **SAMVAAD** (on-line discussion) on "**RACE for LiFE**" organized on World Environment Day 5.6.2023. [**58000 Panchayats, 762 ULB's participated, 500** were present in the event. **Hon'ble Chief Minister**, addressed the occasion and launched '**Advisory' & 'Factsheet' on EPR** developed under this project.

RACE 3.0

SUP Free Ayodhya, January 9th, 2024. **Hon'ble Chief Minister inaugurated the exhibition, Plog Run** organized at Ram Ki Paudi, SUP alternative **Booklet** and **Movie** on Plastic Free UP released by **Hon'ble Minister Shri Arun Kumar Saxena**.

Image 2: SUP Alternative Booklet and a movie on the impact of plastic littering on rivers, were also launched by the Hon'ble Ministers during RACE 3.0 in Ayodhya. [Photo Credits: GIZ India/CES Project

4. Smart Solutions

Business to business (B2B) meetings to promote single-use plastic alternatives: B2B meetings during the RACE 1 campaign showcased potential solutions from over 70 manufacturers of single-use plastic (SUP) alternatives. These interactions fostered collaboration and partnership opportunities across B2B and B2G sectors, along with Research and Development support to advance plastic alternatives within Uttar Pradesh. This event looked into packaging alternatives, eco-design, policy and governance support for scaling- up plastic alternatives with industry experts, start-ups, single-use plastic innovators and key government stakeholders.

EPR Implementation: Engagement with plastic waste processors (PWPs) and Brand Owners to boost EPR Regime for the Plastic Packaging Sector within the state.

Technology Exhibition: An exhibition by innovators and start-ups was planned to showcase single-use plastic alternative solutions such as compostable packaging, sustainable and refillable packaging, among others. SUP alternative manufacturers and solution providers from across the country displayed unique alternative products derived from natural fibers such as bagasse, rice, and wheat bran, plant and agricultural waste, and coconut leaves.

5. Partnerships

The Department of Environment, Forest and Climate Change (DoEFCC) and the Urban Development Department, Government of Uttar Pradesh, collaborated with GIZ India to organise the "RACE" Campaign - Reduction, Awareness, Circular (Solutions), Mass (Engagement) for single-use plastic free Uttar Pradesh.

As a core component of the Green and Sustainable Development Partnership (GSDP) between India and Germany, the CES project funded by the German Federal Ministry of Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) in partnership with the Ministry of Environment, Forest and Climate Change (MoEFCC) promotes sustainable consumption and production to address plastic pollution through innovative circular economy solutions. CES Project supported the DoEFCC, Government of Uttar Pradesh along with the implementation of the RACE Campaign.

The RACE campaign followed a multistakeholder approach by bringing together the DoEFCC, Urban Development Department, GIZ India, government representatives, ULBs, NGOs, youth groups, industry experts, and civil society to collaboratively address single-use plastic reduction in Uttar Pradesh.

6. Programme Amplification

The RACE 1 campaign united government bodies, industry experts, NGOs, and youth groups to tackle single-use plastic in Uttar Pradesh through collaborative efforts. Activities included plastic collection drives, plog runs, and the installation of plastic banks, alongside a Technology Exhibition in Lucknow showcasing SUP alternatives. Around 500 Tonnes of plastic waste were collected and send for recycling during the week-long campaign and more than 4,22,905 citizens participated in the initiative.

(Visit for more information: https://www.giz.de/en/downloads/giz-2023-en-RACE-campaign-for-single-use-plastic-(SUP)-free-uttar%20pradesh-report.pdf)

Image 3: Installation of Bartan Bank, Ghaziabad [Photo Credits: DoEFCC, GoUP]

The RACE initiative can be scaled up by replicating its collaborative model across states, engaging diverse stakeholders, and incorporating activities like exhibitions of SUP alternatives and large-scale awareness campaigns. Leveraging digital platforms, such as virtual "SAMVAAD" to reach local governance bodies and communities can further amplify its impact nationwide.

7. Information, Education & Communication (IEC) Model

The RACE campaign aimed to raise awareness among public and private stakeholders about the impacts of plastic pollution and mobilize collective action to reduce plastic waste in Uttar Pradesh. Through extensive IEC (Information, Education, and Communication) programs, activities like plog runs, plastic collection drives, and upcycling workshops were conducted to promote sustainable practices. Meetings inspired green heroes, market associations, brand owners, and other private stakeholders to join the campaign.

Image 4: Plog Run and Mass Pledge Drive, Lucknow [Photo Credits: DoEFCC, GoUP]

Image 5: Participants during the Pledge and Plog Run with senior government officials [Photo Credits: GIZ India/CES Project]

Government representatives engaged diverse groups, including students, NCC cadets, National Service Scheme (NSS), NGOs, RWAs, and civil society, fostering widespread participation. Initiatives like mass pledge drives encouraged citizens to adopt the principles of reduce, reuse, and recycle to minimize plastic consumption. The Uttar Pradesh Pollution Control Board (UPPCB), in collaboration with PIBOs and recyclers, oversaw the transportation and disposal of collected plastic waste. Additionally, innovative community programs such as Bartan Banks, Thaila Banks, and ECO-Melas were launched across ULBs to drive impactful local engagement.

8. Programme Monitoring and Evaluation

The online monitoring portal, was established to monitor and evaluate all the activities under the RACE Campaign. In addition, the portal served as a platform for users to pledge their (online) support towards the campaign as well as allowed ULB representatives to upload photos of different activities organised across cities and towns during the first phase of the five-day RACE Campaign.

9. Challenges Encountered and Overcome

The RACE campaign added significant value by inspiring others through its inclusive approach and documenting challenges and successes to serve as a model for future initiatives. Continuous social media engagement boosted outreach, increasing participation in mass clean-up drives and motivating citizens to act.

The campaign also added value by fostering collaboration among diverse stakeholders and organizing technical workshops to enhance understanding of the Extended Producer Responsibility (EPR) framework and alternative solutions to single-use plastics, setting the stage for the Uttar Pradesh Plastic Waste Management Conclave 2022.

10. Website/Application Details

Link to the RACE portal:	https://race4plasticfreeup.in/
RACE Campaign for Single-Use Plastic (SUP) Free Uttar Pradesh [document]	https://www.giz.de/de/downloads/giz-2023-en-RACE-campaign-for-single-use-plastic-(SUP)-free-uttar%20pradesh-report.pdf
Government of UP link to the X page with RACE Campaign posts	https://x.com/UPGovt
Instagram:	SUP Free UP (@plasticfreeup) • Instagram photos and videos

Low-value Plastic Waste Management in Tambaram City, Tamil Nadu

1. Programme Overview

Tambaram City is located within the Chennai Metropolitan Area (CMA), about 15 km from Chennai. Tambaram City Municipal Corporation (TCMC) oversees the overall solid waste management including plastic waste management services in the city. The city's municipal jurisdiction is divided into five zones covering 70 wards. Every zone has dedicated resource recovery centers (RRC) and -material collection centers (MCC) for the collection and sorting of solid waste. The most difficult fraction for recycling is Low-value plastic (LVP) due to its voluminous nature and hard to recycle due to complexities and viable business potential. The lack of formal and informal value chains for LVP results in leakages from existing waste management systems into the natural environment including marine and riverine ecosystems.

To address this issue, a pilot project focused on circularity and safe disposal of low-value plastics has been implemented in partnership with the Department of Environment, Climate Change and Forest (DoECCF) and TCMC in April 2023. The project has focused on sustainable management of low-value plastic waste through an international plastic credit - an outcome-based private sector funding approach.

The above initiative is part Indo-German development corporation project “Circular Economy Solutions Preventing Marine Litter in Ecosystems (CES)” commissioned by the German Federal Ministry of Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV). The project is implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH jointly with the Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India. The project aims to prevent marine litter and plastic leakages in selected riverine and marine ecosystems through resource-efficient circular economy approaches and is implemented in the Indian states of Tamil Nadu, Kerala, and Uttar Pradesh.

2. Relevance

Low-value plastic (LVP) waste refers to hard-to-recycle plastic waste such as Multi-Layered Plastic (MLP) products, chip packets, and other soft and flexible plastic waste. This is mostly characterized by its high level of contamination, lightweight or low density and a high littering potential and has negligible market value.

LVP is hard to recycle and therefore is of least interest for recyclers. The lack of informal-formal value chains for LVP results in leakages from waste management systems to environment, marine, and riverine ecosystems subsequently LVP forms one of the major components in legacy waste dumpsites in cities and causes marine

Image 1:

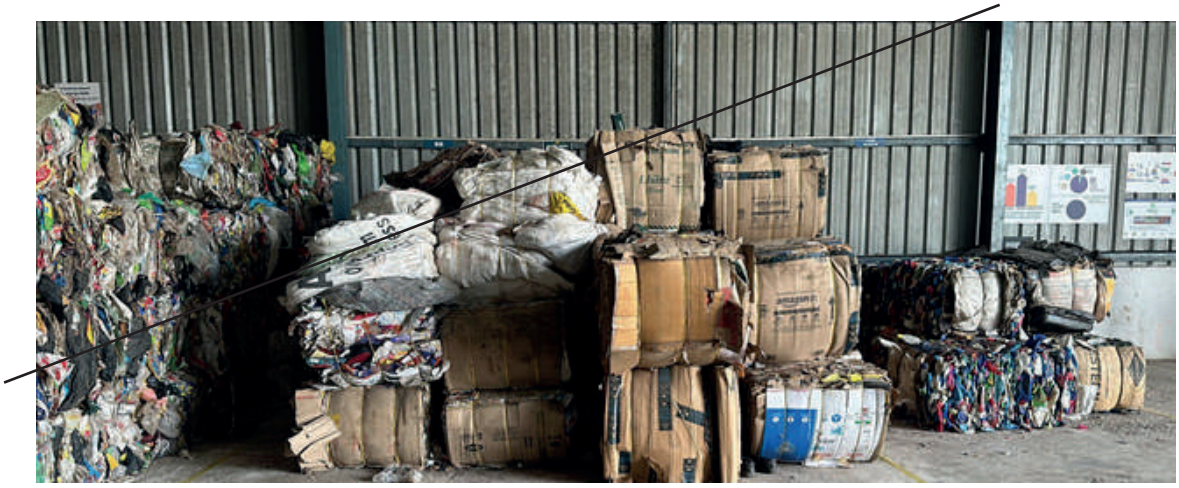
pollution. A major limitation in the LVP value chain is the high cost of its collection, sorting, and recycling/end-of-life disposal which is significantly higher than the revenue generated from the sales of recovered plastics. The pilot measures aimed to demonstrate a solution for the safe recovery and disposal of Low-Value Plastics from Municipal Streams adhering to high standards of traceability, and social and environmental standards.

3. Detailed Programme Description

Recovery of Low-value plastic: A dedicated Material Recovery Facility (MRF) for low-value plastics was supported to source the low-value plastic waste from RCC/MCC centres in three zones of the city, to recover non/low commercial recyclable and non-recyclable plastics. TCMC was involved in transporting the segregated low-value plastics mainly flexibles and MLPs to the established MRF. After recovering the recyclable fractions of waste, the remaining non-recyclable waste was disposed of through co-processing in cement industries. The MRF acts as a tertiary recovery center dedicated to low-value plastics.

Digital Tracking and Traceability: At the MRF, records are maintained for end-to-end documentation viz. Material received, sorted, channelized for end destination processing from cement industries, endorsement certificate from TCMC. All these documents in addition to weighbridge slips, disposal slips and other logistics-related documents are uploaded on the online platform (Platform by rePurpose) . This chain of custody of documents via an online platform maintains transparency with respect to date, time, location and uniqueness throughout the value chain.

Image 2:



Audit and Assurance: with the support of the project partner's exhaustive audit and assurance program multiple layers of auditing including internal and independent third-party audits are part of project implementation. Below is the Audit and Assurance framework for Verified Plastic Recovery:

- **First Level Audits:** A two-tier audit and verification system is in place to review all the chain of custody documents post which Verified Plastic Recovery Units are generated on a monthly basis.
- **Internal Audits:** Annual Audit by rePurpose internal team of the project through both documentation and onsite review.
- **External Audits:** Annual Independent Third Party Audits are facilitated by rePurpose Global through both documentation and onsite review.

Generation of Verified plastic recovery units (Similar to Plastic Credit): After the external audit, plastic credits are generated in the name of the brands aiding them to offset their plastic footprint. Every kilogram of plastic that is recovered or processed is termed a Verified Plastic Recovery Unit or Plastic Credit.

4. Smart Solutions

Some of the innovative technologies are given below

- The unique standards and protocols being used by the project partner i.e. Verified Plastic Recovery Protocol and Impact Code promote the building of ethical waste management companies in the industry for promoting the long-term sustenance of a circular economy.

- A full suite software solution for digital track and trace as well compliance management system focused on environmental & Social safeguards called Retrace. Digital tracking of records and documentation such as first mile collections, mass balance, last mile transportation, processing certificates, transportation and logistics documents etc. was done through this in-house traceability and compliance platform, reTrace. This helped agencies and local authorities to monitor and validate the documents in real time and helped them achieve transparency and accountability
- An innovative model called "Outcome based financing Global Plastic credit" which leverages verified plastic recovery helped to streamline the LVP waste management operations by channelizing sourcing funds from global consumer packaging brands. This innovative financing instrument is completely voluntary and is able to link consumer brands, and brand owners across the globe to direct and additional on-ground impact.

5. Financial/Revenue Model

- The intervention mobilised finances through outcome-based financing to enable the private sector to establish and manage low-value plastics. There were no capital investments from the government or private sectors involved.
- The key investment was for rapid Assessment of all municipal waste management facilities, feasibility studies for recycling and development of verified plastic recovery (similar to plastic credit) models, training and capacity building workshops for municipal staff and stakeholders were organized to enhance understanding and implement plastic waste management. The approximate cost for implementing the system was EUR **16,000**.

6. Partnerships

The CES pilot project aims to promote circular economy approaches to prevent marine litter, which is a key focus area of the Green and Sustainable Development Partnership (GSDP) signed between India and Germany. (Driving forward the reduction of marine litter in the Indian Ocean - giz.de). The pilot in Tambaram is implemented in collaboration with the Tambaram City Municipal Corporation (TCMC) to implement solutions for low-value plastic management. Under this project, GIZ has partnered with RePurpose Global to develop the initiative for the recovery of low-value plastics. RePurpose Global has engaged with the waste management agency (WMA) Green Worms to carry out the on-ground operations of low-value plastic waste management. The project has developed and shared the learnings on the implementation of projects. The key requirement for scaling impact is bridging the gap between local bodies, waste management agencies (experts in carrying out on-ground plastic recovery operations) and private financing through outcome-based financing. This model can easily be scaled up with the implementation of ongoing Extended Producer Responsibility for plastics packaging with the support of State governments, Cities and Private Sector.

Image 3:

7. Programme Amplification

The project demonstrated the recovery of low-value plastic waste by leveraging finances through outcome-based financing by channelising low-value plastic from municipal-owned facilities to a privately owned recovery facility. This facility was established through outcome-based financing through **Verified plastic recovery units** (**similar to** plastic credits). This private MRF facility handles more than **62 MT of low-value plastic** from the Tambaram Municipal Corporation every month, showcasing a sustainable model for managing low-value plastic.

The model can also be replicated with government-owned MRF facilities where the revenue from EPR certificates can be focused on optimizing the MRF operations for more recovery of low-value recyclables from municipal solid waste. Additionally, Urban Local Bodies can enter into a partnership with agencies working on EPR certificates or plastic credit and leverage outcome-based finances to manage the transportation and handling costs of low-value plastics.

8. Programme Monitoring and Evaluation

The system established by "Repurpose Global" for the operation of verified plastic recovery units has indirectly supported the monitoring, evaluation, and even learnings towards adapting changes in waste flow. The project has just not established systems for reviews of chain of custody of documents on transparency with respect to date, time, location and uniqueness but also established social and environmental outcomes of the project and its monitoring.

9. Challenges Encountered and Overcome

The main challenge was to handle low-value plastics in a scientific manner as LVP are contaminated with food residue or mixed with other materials, making them hard to recycle. The sorting process is complex and costly. The cost of recycling low-value plastics often exceeds the value of the recycled material. This makes it economically unfeasible without subsidies or incentives. The plastic credit model helped to address this issue by sourcing funds for managing low-value plastics by establishing linkages with end-of-life processing facilities like cement plants.

11. Website/Application Details

Website	Driving forward the reduction of marine litter in the Indian Ocean - giz.de

7.8

Centre for Environment Education (CEE)

Empowering Women Self-Help Groups through Sustainable Livelihoods: A Transformational Tale

1. Programme Overview

Centre for Environment Education (CEE) with support from organizations like the HDFC Bank, Hyundai Motor India Foundation, and JK Papers is working towards the formation, stabilization, enhancement, and strengthening of existing waste management practices at various pilot locations like Jammu (J&K), Samastipur (Bihar), Guwahati(Assam), Nirmal(Telangana), Mehabubnagar (Telangana), Ganjam (Odisha), Bastar (Chhattisgarh), Ranchi (Jharkhand), Shirwal (Maharashtra), Kagaz Nagar (Telangana). CEE is using an innovative model of transforming and empowering Self-Help Groups (SHGs) through sustainable livelihoods with the aim to ensure efficient waste collection, transportation, and processing while maximizing material recovery, and building market linkages. In addition, SHGs have been empowered to set up alternatives to single-use cutlery and disposable plastic utensils in the form of a Bartan Bank (utensils bank). Also, CEE has undertaken training and capacity building of SHGs to generate wealth out of waste by recycling waste into environment friendly bags. The model showcases community engagement at every stage of decision-making; to ensure transparency, accountability, and project sustainability.

2. Relevance

Comprehensive sanitation goes beyond achieving Open Defecation Free (ODF) status and includes proper management, processing, and disposal of waste. These are critical components of sanitation that are challenging to execute well particularly due to, limited awareness, lack of appropriate infrastructure, and insufficient resources.

The Swachh Bharat Mission (SBM), launched in 2014, is addressing these challenges by promoting cleanliness behaviours and building sanitation facilities across rural and urban India. However, achieving long-term sustainability necessitates a shift from top-down approach to community-driven solutions. Engaging with the community, understanding their perspectives, and addressing their concerns fosters a sense of ownership and collaboration. It also leads to community trust building, which is a critical factor in the success of any intervention and for achieving successful behaviour change. Transparent communication and consistent follow-up that involve community representatives in the decision-making processes, helps in establishing and maintaining trust. Hence, deploying women SHGs become an innovate solution towards community-led initiatives.

Women Self Help Groups (SHGs) have been a cornerstone of India's rural development strategy, representing a powerful force for positive change. These women-led groups have demonstrably contributed to the improvement of sanitation and hygiene practices in rural areas. Their unique strengths and community-based approach make them valuable partners in ensuring the mission's success. By investing in their capacity building, facilitating market linkages, and providing financial support, SHGs can be further strengthened to achieve sustainable waste management.

3. Detailed Programme Description

The district of Bastar, located in the state of Chhattisgarh and district of Samastipur in Bihar have been facing many challenges towards sustainable management of waste. In many parts of these districts, for instance, waste is majorly burned or disposed of in the open, endangering human health and the environment. This is due to the lack of guidance and awareness on waste management systems between villages and panchayats. Additionally, the community, especially women, struggle with limited employment opportunities in the region. In response to these challenges, District Rural Development Agency (DRDA); Bastar, and Samastipur, HDFC Bank, Centre for Environment Education (CEE), Shrishti Waste Management Services Pvt. Ltd. (service provider), and Najagriti (service provider at Samastipur) are implementing a community-led, systems-driven programme "Rural & Urban Landscape Free of Dry & Plastic Waste" across 1 block (114 villages and 71 Gram Panchayats) in Bastar and across 11 blocks and 100+ villages in Samastipur. The programme introduces sustainable solutions for dry & plastic waste management in the districts while generating livelihood opportunities for women Self Help Groups (SHGs) and building their capacities through training and skilling.

Image 1: SHG women at an MRF Centre

Systems and mechanisms have been developed in each of the villages and Gram Panchayats (GPs) for engaging and onboarding women SHGs to dry and plastic waste collection that includes segregation, transportation, processing, sale, and safe disposal of the waste. Initially, discussion meetings were held with all the community members and local bodies to help them understand the need for an efficient waste management system and about the various interventions under the programme.

Thus far, the programme on average receives 40-50 g of waste per household of 5-6 persons per day, even though collection of waste operates on a weekly basis. In Bastar, a total of 541 MTs of waste was collected over 16 months. Nearly 64 MTs of this total was collected from villages, of which an estimated 14 MTs (15 lacs of packages) were multi-layered plastics (MLP). In Samastipur, about 2,301 MTs of waste was collected over 22 months; with nearly 134 MTs of it collected from villages/panchayats with approximately 67 MTs (74 lac empty packages) being multi-layered plastics (MLP).

Additionally, this model emphatically promotes purchase of plastics from rural and urban areas and advocates for greater convergence of rural-urban in all rural projects.

4. Smart Solution

A Participatory Rural Appraisal was conducted that socially mapped key resources, hotspots of waste collection and littering, identified the location of storage points in villages, and specified which two women would be responsible for collection. The Self-Help Groups (SHGs) were then onboarded through a systematic process of agreements on various issues via village meetings. Once agreements and consensus between the parties were reached, SHG members engaged in collection and primary segregation of waste, as well as storage at the village sorting sheds. The collection activity is a paid endeavour that the SHGs engage in as a part of the programme. This amount is generated from the sale of segregated recyclables and other dry waste that is transferred to the bank account of the SHG group or the panchayat account as per the agreements.

Image 2: Participatory Rural Appraisal

For a transparent payment system, rates of sale were mutually decided and agreed upon amongst the respective SHG, Panchayat, and team. A standardized reporting and monitoring system that was developed under the programme ensured a transparent payment mechanism for the SHG members. This supported the SHGs in promoting themselves as a sustainable business model.

Through the sale of the collected waste, SHG members generated a stable and consistent income for themselves. Under the initiative, regular training and capacity-building was provided on waste management and recycling techniques. The women SHG members have received special training on driving e-rickshaws for the collection of waste in villages.

As a result of the continued efforts and regular engagement with SHG members, the programme has been able to onboard 46 women-led SHG groups with 460 women members in Bastar and 9 SHGs with nearly 90 women members in Samastipur for regular waste collection. Before this initiative, these women were largely not generating any income from waste and struggling to meet their basic needs.

5. Financial/Revenue Model

The introduction of the programme has led to an increase in income. Each woman now earns a substantial income of INR 5,000 to INR 7,000 per month and is better equipped to manage household expenses and support their families. Through the initiative, 13 women have been employed in the Material Recovery Facility (MRF) at Bastar and 10 at Samastipur as employees performing waste segregation. This has not only led to an overall improvement in waste management but also fostered confidence in women as they were recognized for their efforts.

The programme, whilst improving the socio-economic condition of the SHG members by providing them with livelihood opportunities and improved health and social conditions, has also challenged gender stereotypes by showcasing women's potential to engage in waste management. The HDFC Bank-CEE initiative is empowering more than 700 women SHGs across the landscapes of the programme through capacity building in waste management in their respective villages/panchayats. The active participation in waste collection and recycling has transformed these women into role models for others to be inspired by for a cleaner and greener future.

6. Programme Amplification

The programme has been able to keep momentum through the operationalization of Bartan Banks and Tailoring Units. Some groups have engaged in operating Bartan Banks (lending steel utensils in exchange for monetary payment) as an alternative to single-use plastics, and others have engaged towards operating Tailoring Units in Kagaz Nagar, Telangana. The newfound confidence has allowed SHG women to play an active role in decision-making and assume more responsibilities and a position of authority both within their families and the community. With this fresh sense of purpose, these women are envisioning a brighter future for themselves and their families.

Image 3: SHG member operating Bartan Bank

The Centre for Environment Education, with its vision to empower and engage women SHGs under the Swachh Bharat Mission, has implemented a unique intervention in Kagaz Nagar, Telangana with the support from Sparsh Social Foundation and Sirpur Paper Mills Ltd. The "Integrated Paper and Plastic Waste Management" initiative was launched to address the growing threat of plastic waste and encourage sustainable practices in Kagaz Nagar. All processes of implementation under this initiative are agreed upon amongst the women in their respective groups. To encourage the concept of "Waste to Wealth" and the potential for eco-friendly products, the initiative engaged and empowered women SHGs towards establishing Tailoring Units. Three Tailoring Units (with 12 machines and other stationary items, seed capital for clothes amounting to INR 1,35,000) were started by 70 women under this initiative in the Gram Panchayats of Vanjari, Bareguda and Chintaguda. These units work as the focus point of change, where waste is upcycled as environmentally friendly bags. To run these units, women from SHGs received hands-on training on skills and entrepreneurial insight for 6 months (amounting to INR 35,000).

A Bartan Bank initiative was also implemented in Kagaz Nagar District. Operated by the SHGs, the initiative aimed at reducing the use of single-use plastic cutlery items at various functions in the villages by replacing them with reusable cutlery items. Community members can borrow these utensils for events like weddings, festivals, or large gatherings instead of using disposable plastic plates, cups, and cutlery for nominal charges. A proper system for managing the lending processes, that is, registration, borrowing, returning utensils, records keeping, accounting, billing, and funds management was established by the initiative. This was institutionalized in one of the SHGs. Under this initiative, 600 units of steel utensils (plates, bowls, spoons, cups, and glasses) have been provided to the SHG for community events. Through this initiative, SHGs have become empowered to take ownership and actively contribute to sustainable income generating practices within their neighbourhoods. Overall, the Bartan Bank concept offers a simple yet effective solution to address both the growing problem of plastic waste and low livelihood opportunities amongst women by promoting reusable alternatives and fostering a sense of community ownership in SHGs leading to a cleaner and more sustainable environment.

7. Partnerships

Links were established locally in villages by women members. For the Tailoring Units, the programme entailed the engagement of local government departments towards ordering school uniforms. The Units, today, have multiplied; 22 more women have purchased sewing machines with their own funds (investing approximately INR 1,65,000). The previously mentioned three Tailoring Units have relocated to other villages. They have stitched more than 2,000 environmentally friendly bags out of waste and earned nearly INR 35,000/-. Till now 70 women who belong to Self-Help Groups (SHGs) have actively participated in these activities due to newfound opportunities to improve their skills and earn a profit.

8. Information, Education & Communication (IEC) Model

For the Tailoring Units, more than 800 community members were fully informed and made aware of the advantages of using cloth bags instead of single-use plastic ones. Whereas, for the Bartan Banks, promoting reusable alternatives and fostering a sense of community ownership contributed to its success. Such interventions were possible due to extensive promotion and awareness creation activities around sustainable practices and eco-friendly alternatives.

9. Website/Application Details

Social Media Promotion	https://www.instagram.com/cee_india/p/C40GgTlRgd6/?img_index=1

7.9

Saahas Zero Waste

An Ecosystem Approach to Plastic Waste Management

1. Programme Overview

Saahas Zero Waste (SZW) is an IMS certified social enterprise that offers holistic waste management solutions to corporates, governments, international organisations, bulk waste generators and consumers. They have been operational for 10 years with a focus around nature, people, and technology. They work to create a zero-waste world through a circular economy. The ecosystem approach at SZW is an all-encompassing and innovative initiative tackling the complex issues of dry waste management with a special focus around plastic waste management and informal waste workers. The initiative, started in April 2024 and currently operational in South of Bangalore, is expected to link together multiple ecosystem solutions that will help create and operate a seamless, sustainable, and profitable system while recognising stakeholder collaboration. It is looking to stitch together a systems approach through key aspects like establishing efficient infrastructure, ensuring optimal operations, informal sector integration, and driving behavioural change.

2. Relevance

The Indian waste management system is dominated by the informal sector where compliance with safety protocols and standard operating procedures (SOPs) are rare. Informal waste workers are found working in unsafe conditions without any personal protective equipment (PPE) such as gloves or masks. Largely, informal workers do not have access to social security schemes, minimum wages, and fixed working hours. An integrated audit of 167 Collection Centres (CC) built by the Bruhat Bengaluru Mahanagara Palike (BBMP) found that some centres were defunct, and others functioned inefficiently. These centres were found processing only about 15% of the waste generated per day in the city of Bangalore. An informal structure also typically means little to no data traceability. Many plastics either get rejected or remain neglected, and thus get sent to local, informal aggregators that have little accountability. These challenges highlight the gaps in managing waste in India. These gaps include the absence of adequate infrastructure at the front end, inadequate technical solutions, insufficient data on waste generation rate and waste characteristics, and appropriate budgets to sustain viable systems, and a weak regulatory framework with stringent enforcement.

According to the Annual Report on Plastic Waste Management by Central Pollution Control Board (CPCB) under the Ministry of Environment, Forest, and Climate Change (MoEF&CC). India generates around 3.4 MTs of plastic waste annually, and the recycling rate is about 30%, leaving the rest unaccounted. This large gap in plastic recovery

is primarily due to inadequate infrastructure and a fragmented supply chain, with minimal interaction among stakeholders. Informal waste workers, who play a crucial role in waste management, often face poor working conditions and lack access to social security. The SZW ecosystem initiative aims to bridge this gap by enhancing plastic recovery processes and integrating informal workers into a professional system, thereby contributing to a more sustainable and equitable waste management framework.

3. Detailed Programme Description

The ecosystem project of SZW encompasses the framework of a) Infrastructure Development, b) Stakeholder Engagement, and c) Creating a well-defined and traceable waste management model. This includes the possible establishment of the following management infrastructure:

- **15 Collection Centres (CCs):** The fist point of aggregation and primary sorting of dry waste.
- **1 Material Recovery Facility (MRF):** For secondary sorting and pre-processing the waste ready for the next stage.
- **1 Plastic Recovery Facility (PRF):** Dedicated to plastic waste recovery and enabling value addition required prior to recycling.
- **1 Plastic Recycling Unit:** For final processing and recycling of recovered plastics. These facilities will be enabled through comprehensive us of technologies such as IoT-enabled weighing scales, Management Information Systems (MIS) for real-time monitoring, traceability tools for end-to-end tracking of waste and machine learning-based quality control systems.

For maximising stakeholder inclusion to ensure sustainability, the programme works towards including the existing waste management supply chain actors like waste workers, scrap dealers, and aggregators, into a professionalised waste management unit. SZW offers them access to social security in an effort to improve their living conditions.

Image 1: Material Recovery Facility at Bangalore

Further, as part of formalization of informal workers and social entrepreneurs, the initiative carries out an extensive selection process. This includes mapping and profiling, ability and psychometric testing, background checks, internal Committee Reviews and onboarding.

The Ecosystem Approach has thus far achieved the following:

Improvements in Lives of Waste Workers: The financial and social status of waste workers have seen improvements. The waste workers have moved from informal work conditions to formalised roles with better wages, benefits, and respect for their labour, which were previously lacking.

Improvements in Plastic Waste Recycling: As of September 2024, 103.21 tonnes of plastic waste have been diverted as a result of the formalization of informal workers and improved recycling processes.

Set-up of Collection Centres and Facilities: Currently, 5 Collection Centres have been set up, 1 MRF and 1 PRF are under process to be established to optimize the waste recovery infrastructure

Selection and Onboarding: Four individuals have been selected and onboarded as social entrepreneurs. More are undergoing the process for future efforts. During the next quarter of the initiative, SZW will measure impact that it has made on the lives of all stakeholders.

4. Smart Solution

Some of the smart solutions that SZW is deploying includes technological innovations like IoT-enabled weighing scales and Management Information Systems (MIS). These are being deployed for real-time monitoring and end-to-end traceability of waste and machine learning-based quality control systems are utilized. Through these digital solutions, operational efficiency to track and minimise leakage of waste is enhanced that leads to maximum resource recovery and responsible management of waste.

Image 2: Segregation and management of waste by Saahas Zero Waste workers

The IoT-enabled weighing scales helps digitize the movement of plastic waste materials across various stages of the waste management process. These devices capture inward, daily production, and outward movements at collection centres, material recovery facilities (MRFs), and recycler locations, feeding this data into a comprehensive MIS dashboard. This system ensures better oversight and traceability. Producer Importer Brand Owners (PIBOs) also benefit as this traceability fulfils mandatory reporting, ensuring that all materials are monitored across the value chain.

The main benefits of IoT integration have been:

Data Digitization: IoT devices eliminate the need for manual data entry, enhancing accuracy and reducing errors.

Real-Time Data Availability: The captured data is instantly reflected in the MIS, aiding real time decision-making for production, operations management, and traceability.

Reduced Dependency on Skilled Resources: By automating data collection, the system removes the need for specialized personnel, simplifying operations.

Improved Production and Operation Management: Continuous tracking of materials helps optimize production and operational processes, ensuring smooth workflow.

Enhanced Traceability: Comprehensive data across the value chain ensures that all plastic waste movements are transparent and accountable, supporting compliance with regulatory reporting.

Introducing IoT-enabled technology has helped address the core issue in India's waste management sector, that is, the absence of reliable data. The technology has, thus, enabled a deeper understanding of the waste ecosystem and its value chain.

On the other hand, Machine Learning (ML) is crucial in this initiative towards improving quality control and maintaining high-quality standards of the plastic waste management. It is deployed as a vision system to optimize the sorting of materials by identifying various types of plastics. This improves efficiency by reducing human error and enhancing material categorization for recycling. Without ML, the ecosystem would face challenges of inconsistency in sorting out quality material. ML-based systems also enable robotics and automation for handling challenging materials. Hence, ML provides advanced solutions that surpass the performance of traditional quality control methods.

5. Partnerships

The programme engages with government entities, private companies, and informal sector workers to build a comprehensive waste management system. This collaborative approach is vital for addressing plastic recovery challenges and ensuring the programme's long-term sustainability. These partnerships include collaboration on the following fronts:

Government Collaboration: For regulatory support (authorisations/empanelment), funding infrastructure through budgets allocated and leveraging existing policies.

Private Sector Involvement: Through public-private models, funding the operations through various service fee models and technical expertise.

Informal Sector Inclusion: Prioritizing the upliftment and professionalisation of informal workers, ensuring their inclusion in the formal waste management system.

Development sector partners: They support in driving Information, Education & Communication (IEC) campaigns to encourage behaviour change.

6. Financial/Revenue Model

The financial model for operationalising the supply chain is built on revenue streams from waste sorting and recycling activities. Additional revenue streams are also established through models like Extended Producer Responsibility (EPR), voluntary plastic credits, ethical sourcing surcharges. It is also proposed to consider a user fee collection, especially from bulk waste generators, to ensure commercial viability of waste management.

To ensure that different types of plastic waste are addressed, Extended Producer Responsibility (EPR) incentives are particularly used to target rigid and flexible plastics. EPR ensures these types of plastics are recovered and recycled at authorized facilities. Voluntary plastic credits focus on increasing the value of low-value plastics, preventing their entry into landfills or incineration sites. The Ethical Sourcing Surcharge are applied to materials like PET bottles and LDPE milk pouches. They ensure that upstream operations meet ethical and formalised sourcing standards, promoting responsible practices across the ecosystem. These innovative financial strategies have been designed and incorporated into the initiative to ensure both economic and environmental sustainability of waste recovery.

Funds and investments from the Government and private sector are also leveraged, specifically towards setting up infrastructure and for the initial operational gap funding thereby also incorporating sustainability into the programme.

7. Information, Education & Communication (IEC) Model

Information, Education & Communication (IEC) models such as awareness campaigns, educational workshops, and on-ground interventions have been instrumental in driving community engagement. These initiatives have helped drive behavioural change, encourage proper waste segregation, and increase community participation in waste management activities. By fostering a culture of environmental responsibility, this project creates lasting change at the community level and ensuring the success of its waste management efforts.

Image 3: Awareness training session

8. Programme Monitoring and Evaluation

This SZW initiative employs a comprehensive monitoring and evaluation framework for tracking key indicators. Regular assessments of waste collection and recycling rates, combined with feedback mechanisms, allow for timely course corrections and optimization of the programme's impact. This approach ensures that the project meets its objectives and delivers measurable results.

9. Programme Amplification

This ecosystem model adopts a cluster approach which is designed for scalability and customisation to meet different regional needs. Its sustainable approach and strategic partnerships offer potential for expansion across India, contributing to widespread improvements in plastic waste management. This project will be the ideal demonstrator for subsequent replication in other geographies.

10. Challenges Encountered and Overcome

The project has faced several significant challenges, including financial constraints, reluctance from informal waste sector workers, and inefficiencies in the collection system. Hesitations included:

Informal Workers: A major hurdle was resistance from informal workers who feared losing their livelihoods or being displaced by formalised systems. To overcome this, SZW engaged these workers through training and incentivization, showing them, how formal inclusion could improve their income, provide legal protections, and offer stable work conditions.

Funding and Partnerships: Another challenge was securing the right partnerships and funding, which was achieved by building strong relationships with both local governments and private sector players. Continuous engagement with government bodies was key to navigating complex regulations, ensuring project compliance and long-term success.

Entrepreneurs and Field Staff: There was reluctance to shifting from informal practices. Workers often perceive formalization as restrictive because it introduces standardized processes. For example: Data capturing needs to be done regularly, a practice not familiar to many workers from the informal sector. Environment, Health, and Safety (EHS) regulations such as wearing gloves and masks may feel like they slow down their efficiency. Standardized holidays and Payment of GST seem cumbersome and difficult for those accustomed to flexible, cash-based operations.

Stigma and Lack of Knowledge: There is still a general perception that waste management work is less respectable or undesirable leading to resistance. Further, there is lack of awareness about opportunities. Potential stakeholders often fail to recognize the long-term financial and social impact of the waste management sector.

Financial and Accommodative Restrictions: In the informal sector, many field staff are provided with cramped but free-living spaces near their work areas, which reduces their financial burden. However, when transitioning to a formalised setup, this “benefit” is no longer available. In the formal system, workers are expected to arrange and pay for their own accommodation, which can be a significant financial challenge, especially for those used to informal setups where housing costs were not their responsibility.

Various solutions to these problems have been devised by SZW. These include:

- **Creating Awareness and Positive Reinforcement:** Continuous communication about the importance of safety measures (e.g. using gloves) has proved useful. This also demonstrates how the initiative is working towards protecting workers' well-being and long-term employability. Also, informal workers have been incentivized with the prospect of regular income, legal protection, and consistent work hours, highlighting the greater financial stability formalization that the programme offers. Further, showing workers how formal inclusion not only improves income but also ensures benefits such as insurance and pensions, has created long-term financial security and peace of mind for them.
- **Emphasizing Growth Opportunities:** Stakeholders are made aware that waste will continue to grow as a problem in parallel with rising populations and living standards. This ensures that the sector will remain essential, providing a stable and growth-oriented career path. Workers and entrepreneurs are also motivated by the multiplier effect— by how their contribution creates both personal financial gain and significant environmental impact.
- **Navigating Funding and Infrastructure Constraints:** While space and financial resources are limited, constant communication and engagement with local governments, private sector players, and bulk waste generators have helped in securing more partnerships and funding. This has facilitated a gradual expansion of infrastructure.

11. Website/Application Details

Website	https://saahaszerowaste.com

7.10

GIZ

Gender Transformative Approaches in Plastic Waste Management for Inclusive and Sustainable Communities in Coastal Areas

1. Programme Overview

Trivandrum, located on the west coast of India is one of the largest and most populous cities in state of Kerala generating approximately **440-450 tonnes of Municipal Solid Waste** daily, with plastics constituting 13-14%. A study published by the Central Pollution Control Board in 2022 states that banned single-use plastics (SUPs) comprise 8.2% of the city's plastic waste, with carry bags being the most commonly banned SUPs, constituting over 90% by weight. In April 2023, a **pilot project**, was formally initiated with the Trivandrum Municipal Corporation (TMC) to build upon the **community-based models in coastal areas** led by women self-help groups (SHGs) for waste management, promotion and production of plastic alternatives, fostering inclusive practices that align with Kerala's policies on women empowerment.

The project is implemented as part of the Indo-German development corporation project "Circular Economy Solutions Preventing Marine Litter in Ecosystems (CES)" commissioned by the German Federal Ministry of Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV). The project is implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH jointly with the Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India. The project aims to prevent marine litter and plastic leakages in selected riverine and marine ecosystems through resource-efficient circular economy approaches and is implemented in the Indian states of Tamil Nadu, Kerala, and Uttar Pradesh.

To achieve objectives under pilot project, key activities were undertaken with focus on baseline assessments, training and capacity building of SHG members, awareness activities, consultation workshops and implementation of an economically sustainable circular model in the coastal wards of Trivandrum. After successful implementation, the project was handed over to TMC in April 2024 for successful smooth operation and further replication of learnings in other coastal wards in the city.

2. Relevance

In coastal areas, the absence of effective plastic waste management systems for source segregation, limited community engagement, and inadequate technical skills among women SHGs lead to unsegregated waste collection and undefined processes for proper waste disposal. Local authorities must address these systemic challenges by implementing capacity-building measures and developing robust systems to ensure comprehensive end-to-end management of plastic waste in coastal communities.

Image 6: Waste Segregation Training

In Trivandrum, the project's focus areas are the coastal wards wherein the population groups are primarily engaged in fishing and exhibit a tightly knit structure with clear social hierarchy. Traditionally marginalised and vulnerable to poverty and natural disasters, these communities have maintained a clear gender divide. The pilot project targeted 30,000 individuals across 4,000 households in three coastal wards involving women SHGs, emphasizing gender inclusion in line with the state policies on women empowerment. Working closely with the Trivandrum Municipal Corporation, the project aimed to address the issue of waste collection and management to prevent marine litter and plastic leakages in selected marine ecosystems. In addition, a key focus was placed on building community-driven models that foster economic empowerment and challenge traditional gender norms by positioning women as environmental and social leaders.

At the community level, the project brings direct, positive impacts to coastal communities, particularly women involved in the waste sector. By involving local women in the waste management process, the project not only addresses the problem of plastic waste but also promotes economic empowerment and financial independence. In this context, a decentralised model for waste collection and management was promoted for inclusive and sustainable waste management that aligns with Kerala's policy framework of decentralized waste management and livelihood generation.

3. Detailed Programme Description

A comprehensive approach was undertaken to integrate gender-transformative strategies within Kerala's decentralised waste management framework. In 1997, the Government of Kerala initiated the *Kudumbashree* Mission as a poverty eradication and women empowerment programme. *Kudumbashree* organises women into SHGs at the grassroots level, providing options for livelihoods ranging from micro-enterprises to social development projects, and has become a driving force behind women's empowerment, transforming them into active contributors to their families and communities. Working under the state local self-government department, the SHG members are integrated into a system called as Haritha Karam Sena (HKS) or Green Warriors for waste management operations. HKS is a professional team of technicians, supervisors from SHG groups who are assigned with the responsibility of collection, transportation, and processing of solid waste in association with respective Local Self-Governments (LSGs) of Kerala. The key interventions under the project are as follows:

- **Baseline Assessment and Stakeholder consultation:** The project involved preliminary assessment, baseline data collection, stakeholder consultations, and study on possibilities for upgradation of current infrastructure arrangements in place.
- **Awareness and capacity building:** The pilot project focused improving source segregation by launching awareness drives and imparting training to households by women SHG members on source segregation practices. Community awareness activities, including school programs, door-to-door campaigns, community participatory discussions and clean-up drives, were launched with a focus to shift local attitudes towards sustainable waste disposal.

Image 7: Awareness Sessions for School Children

- **Digital Tracking, Monitoring and Reporting:** HKS members use the state government's *Haritha Mithram* mobile application to record waste collection data, enhance operational transparency and enabling real-time tracking. A project dashboard functions as a centralised monitoring system, allowing government stakeholders to monitor waste collection volumes and efficiency, ensuring compliance with local rules as well as national policy of solid waste and plastic waste management and improved decision-making.
- **Social support to Haritha Karam Sena:** The project had also supported the SHG members - by educating them about their roles, responsibilities and providing necessary trainings on efficient waste management practices. Recognizing the emotional and psychological challenges faced by women in waste management, the project had also initiated 'wellness initiatives and medical camps' to provide support and conversations about mental health.
- **Revenue Generation:** Revenue is made from the user fees collected from waste generators and from the sale of recyclable items to plastic waste processing units.
- **Sustainable Alternatives to Plastics:** In addition to waste management, selected SHG members were trained to produce eco-friendly plastic alternatives, such as cloth bags and reusable sanitary products. The initiative not only addresses waste reduction at the source but also boosts local women-led businesses by developing a market for eco-friendly products. A Cloth bag vending machine (first in the state of Kerala) was installed in the city to serve as a marketing medium for the sale of cloth bags manufactured by the SHGs.

4. Smart Solutions

Innovative methods were used to integrate and streamline women SHGs into waste management services. This includes:

Digital training: Aligning with the " *Digital India*" initiatives by Government of India as well as service delivery approach using digital tools as promoted by the Government of Kerala, the project had focused on imparting

Image 8: Women SHGs in Training

Image 9: Women SHGs in Training

digital service trainings for HKS members, such as using a smartphone, making digital payments through UPI (Unified Payments Interface) systems etc. This helped to enhance the digital literacy of the women SHG members.

Mobile application: The Government of Kerala's *Haritha Mithram App* was used to digitally record door-to-door waste management services. The mobile application is a smart garbage management application for monitoring non-organic waste management system in Kerala. It includes features such as real time reporting of waste collection, user fee collection, GIS and GPS tracking of garbage removal as well as customer support for grievances. Women SHGs or HKS were trained to use the mobile application for monitoring and reporting purposes which helped them to streamline their waste management operations.

Social media platforms: Social media platforms were leveraged for service promotion and effective data management, serving as monitoring and communication tools for the onground activities. The use of social media platforms enhanced the service delivery systems as well as supported grievance redressal for waste management amongst the coastal communities.

5. Financial/Revenue Model

- Local and state government incentives play a vital role in financing the program's training initiatives for Women SHGs. These funds are directed toward capacity building, equipping HKS members with skills in waste management, eco-friendly product creation, and financial literacy to foster a self-sustaining workforce.
- **Revenue from User Fees and Recyclable Sales:** The HKS members collect user fees from households and businesses, covering core operational costs like collection, sorting, and transportation. Additionally, the sale of sorted recyclable plastics to waste processing units provides HKS members with an essential income source, supporting financial sustainability.
- **Local Business Collaborations for Product Sales:** Partnerships with local businesses enabled HKS members to market sustainable products like cloth bags, boosting their financial independence. In this regard, the installation of Kerala's first cloth bag vending machine in Trivandrum is a significant achievement for creating a marketing and selling point for cloth bags manufactured by SHGs. The vending machine not only promotes sustainable alternatives to plastics but also offers additional income opportunities for the women SHG members for the sale of products in the local market.
- **Extended Producer Responsibility (EPR) Funding:** EPR systems which work on "polluters pay principle" was enforced under plastic waste management rules in 2022 by Government of India, making producers, importers and brand owners[2] to take liability on plastic packaging waste introduced in market. The project has explored the possibility of utilising/ channelising the funds from brand owners to facilitate the collection and processing of plastic waste, by linking plastic waste disposal with registered plastic waste processors (cement plants, recycling units).

[2] *Please refer to the plastic waste management rules 2016 and its further amendments for detailed aspects related to EPR https://eprplastic.cpcb.gov.in/*

6. Partnerships

The CES project aims to promote circular economy approaches to prevent marine litter, which is a key focus area of the Green and Sustainable Development Partnership (GSDP) signed between India and Germany. (Driving forward the reduction of marine litter in the Indian Ocean - giz.de). The (CES) pilot project is supporting Trivandrum Municipal Corporation (TMC) in tackling marine litter with decentralised plastic waste management across three selected coastal wards working closely with the state department of environment, state pollution control board, local self-government department (LSGD) and its allied institutions like *Suchitwa* Mission, *Kudumbashree* for the smooth implementation of the project. These government entities play critical roles in scaling and expanding the initiatives through policy alignment, resource allocation, and capacity-building efforts. TMC drives decentralized plastic waste management by mobilizing communities and institutionalizing best practices. The LSGD and its allied institutions ensures grassroots implementation through resource mobilization and SHG engagement. Regulatory bodies like SPCB oversee compliance providing strategic guidance, ensuring the project aligns with state and national rules and regulations enabling effective scaling and sustainability.

GIZ had engaged with the waste management agency (WMA), Green Worms to develop and implement an economically sustainable circular model by managing the plastic waste generated across these three coastal wards. Green Worms involved women SHG members from the coastal wards to strengthen the existing waste management operations and facilitated operationalisation of EPR by channelising the segregated plastic waste to recyclers and co-processing in cement industries. In addition, the agency named Thanal was entrusted with the responsibility of reviving SHGs in supporting the production of plastic alternative products. These partnerships offer a blend of regulatory, logistical, and technical support, and support scale-up potential, ensuring sustainable practices while aligning with government priorities.

7. Programme Amplification

The project has helped in better formalization of SHGs and streamline their work to achieve maximum efficiency, enhancing their organizational and leadership skills, and establishing collaborations with local businesses, thereby promoting a sustainable market for their products. Capacity-building activities empowered women, resulting in wages nearly doubling in project locations. On an average the induvial members of women SHGs had a monthly income of INR 5, 000 which increased to INR 11,000. In addition, household cooperation for waste management increased from a baseline of 15% to over 80% indicating that the project was able to contribute to shift the public perceptions towards women in waste management, promoting respect and acceptance and thus cooperating in the waste management operations. Women-led SHG members have been trained and supported to manage waste effectively and produce eco-friendly products, which has also led to increased financial independence, enhanced rights, resources, and leadership roles, challenging the conventional gender norms of the society.

8. Information, Education & Communication (IEC) Model

Working with TMC, specific campaigns were organised prioritising dialogue, trust, and ownership, involving representatives of all genders, aligned with the state government's inclusive initiatives. Recognising the emotional and psychological challenges faced especially by women in waste management, the project had initiated 'wellness initiatives and medical camps' to provide support in overall health and well-being of women SHGs. HKS members conducted door-to-door campaigns, educating households on proper waste segregation and disposal. Through engagement with schools and community members, students were made aware of the impact of plastic pollution, thus instilling sustainable practices among youth. Community events, including beach clean-up drives, provided hands-on awareness, particularly for locals reliant on the marine ecosystem, highlighting the need for responsible waste disposal. Public art installations and murals made from recycled materials serve as visual reminders of environmental responsibility, while informational materials and social media campaigns reinforced the key messages.

Image 10: Clean Up Drives

9. Programme Monitoring and Evaluation

For effective monitoring and transparency, Haritha Mithram mobile application was used for real time reporting of door-to-door services and waste generation across the city. Regular feedback was gathered from community members and HKS workers to adapt strategies based on local needs. Monthly progress reports and key metrics, such as waste volume and recycling rates, were reviewed to assess impact. In addition, TMC health officials and senior management conducted monthly and quarterly reviews of the progress of work in the city and special meetings were also arranged focusing on explicit needs in coastal areas that enabled regular feedback and tailored interventions for specific challenges.

10. Challenges Encountered and Overcome

- Women SHGs had limited skills and knowledge in managing efficient waste management operations, which had led to collection of unsegregated waste. They struggled with inadequate funding and financial management skills. This limits their ability to scale up operations and sustain long-term projects. The project aimed to provide necessary capacity-building and training to empower them which resulted in significant increase in their wages. It facilitated transition of Women SHGs into waste management professionals.
- SHG members often lack essential business skills, such as financial literacy, marketing, and management for the sale of plastic alternative products. This hampers their ability to run successful enterprises. The project helped them to establish market linkages and collaborations with local businesses, thereby promoting a sustainable market for their products.
- Socio cultural barriers, traditional gender roles and societal norms associated with Women SHGs resulted lower self esteem and confidence among Women SHGs. Driving the mission of state government to enable social empowerment, through targeted training and capacity-building efforts, the program empowered women to gain confidence, leadership skills, and technical expertise, overcoming social constraints and creating a resilient, women-led workforce for sustainable waste management.

11. Additional Information

The project has undertaken combination of measures on multiple levels simultaneously: on the individual, interpersonal, household, community level to support waste management operations as well as critically reflect and address the underlying social norms, attitudes and behaviors of the communities in coastal areas. The Gender Transformative Approaches in Plastic Waste Management program not only addresses environmental and waste challenges but also serves as a model for inclusive, women-led economic empowerment. By aligning with the state government's Malinya Muktha Nava Keralam (Litter-Free Kerala) campaign, the project has helped to reinforce the state policies focused on sustainable practices and women empowerment.

12. Website/Application Details

Website	https://harithamithram.lsgkerala.gov.in/

The app developed by the state of Kerala- Haritha Mitram- Smart Garbage Management System App marks a revolutionary change in the monitoring of non-organic waste management systems in the state. The Harithamitram enables the stakeholders, from the state level to the local self-government ward level to monitor and evaluate the waste management systems through an online platform. The project facilitated the smooth implementation of digital solutions in the coastal areas where digital literacy is limited.

7.11

BasicShit

BasicShit: Recycled Toilets

1. Programme Overview

BasicShit was founded in 2015 with the mission of addressing India's plastic waste crisis and improving sanitation infrastructure. Their solution involves constructing durable toilets using panels made from recycled Multi-Layered Plastic (MLP) waste. Each dry toilet unit uses approximately 120 kg of plastic waste—equivalent to about 9,000 plastic bottles. With this, BasicShit has developed the eco-friendly public toilet, made from discarded single-use plastic. To date, BasicShit has successfully implemented over 60 prototypes and SKUs, with a focus on urban and semi-urban areas in Delhi. Their primary stakeholders include municipalities, NGOs, and corporate partners interested in sustainable sanitation solutions.

2. Relevance

BasicShit's intervention addresses two major global and national challenges: the growing accumulation of plastic waste, particularly MLP, and the lack of adequate sanitation infrastructure. In India, plastic waste is often dumped in landfills or oceans, causing environmental harm, while millions of people lack access to clean and safe toilets. Public sanitation challenges in urban areas are often overlooked, particularly regarding public urination. The absence of adequate public urinals and sanitation facilities has made public urination a common practice. Even where urinals exist, they may be often inaccessible and poorly maintained, leaving individuals with limited options.

BasicShit's model solves both these problems by converting waste into valuable building materials for sanitation facilities, benefiting both the environment and public health. This solution is particularly relevant for underserved communities where proper sanitation is scarce.

3. Detailed Programme Description

BasicShit's programme focuses on using recycled MLP plastic panels to construct toilets that are easy to assemble and durable. The panels are sourced from recyclers or companies like Hero and Sheraton Ltd., with whom they have set up partnerships for plastic collection. In some cases, they also segregate and recycle plastic waste themselves before recycling. These recycled MLP waste panels allow BasicShit to build toilets faster than traditional methods, while ensuring longevity and resilience. Their toilets range from off-the-grid urinals and dry toilets to modular facilities integrated with UPI payment systems for public health centres. The programme's impact includes reducing plastic waste, providing clean sanitation, and supporting public health.

Image 1: Installation of BasicShit toilet at Majnu Ka Tila Refugee camp

4. Smart Solution

BasicShit makes use of innovative recycled MLP to create plastic panels that sets them apart from traditional sanitation solutions. The panels are durable, water-resistant, and easy to transport, allowing for rapid construction of sanitation facilities even in remote areas. Additionally, the modular design supports a variety of toilet types, from off-the-grid units to UPI-integrated public health toilets. By repurposing plastic waste, they contribute to a circular economy and offer a smart, scalable solution to both plastic waste management and sanitation access. Expected outcomes include reduced plastic waste in the environment, improved sanitation infrastructure, and heightened public health safety.

5. Financial/Revenue Model

The cost of constructing a toilet using MLP plastic panels ranges between 6-10 lakhs, depending on the technology integrated into the facility. Their revenue model relies on partnerships with municipalities, corporate sponsors, and NGOs to cover initial construction costs. Long-term sustainability is ensured through the durability of the materials used, which minimizes operational and maintenance costs. Currently, they are also exploring opportunities to generate revenue through public-private partnerships and government contracts.

6. Partnerships

Collaboration is key to the success of BasicShit model. They work with a variety of stakeholders, including plastic recyclers, corporate sponsors, local governments, and NGOs. For example, they have partnerships with Hero and Sheraton Ltd. for plastic waste collection, as well as collaborations with municipal bodies for the installation and maintenance of the toilets.

7. Programme Amplification

The BasicShit model is highly scalable and replicable, with the potential for expansion to other states and countries. They are currently in talks with public bodies in Delhi and Bangalore to further scale their operations. BasicShit had started out as an NGO and they are currently transitioning into a private organization. Post transition, further growth and wider adoption of their sanitation solutions is expected. In the long term they expect to have a pan India presence.

8. Information, Education & Communication (IEC) Model

They engage with communities through educational campaigns that promote the benefits of sanitation and recycling. They raise awareness about the importance of proper waste disposal and the role of plastic recycling in improving sanitation access. These initiatives help to drive behavioral change and foster greater community involvement in the projects.

9. Programme Monitoring and Evaluation

They have implemented robust mechanisms for monitoring and evaluating the performance of their programmes. Regular assessments are conducted to ensure that construction timelines are met, toilets are functioning as intended, and maintenance protocols are adhered to. Feedback from users and partners is also collected to inform any necessary adjustments. These processes help them identify potential challenges early and make timely course corrections.

10. Challenges Encountered and Overcome

One of the main challenges they faced was raising awareness and building trust in the use of recycled plastic for construction. Many stakeholders were initially sceptical about the durability and safety of the solution. Through continuous education, advocacy, and demonstrating the effectiveness of the toilets, they were able to gain acceptance and support. Logistical challenges related to sourcing enough MLP waste were also overcome by establishing strong partnerships with recyclers and refining the waste segregation processes.

Image 1: Vanphool school girls' toilet

11. Other Information

Their future vision involves the development of completely dry toilets that do not rely on water, making them viable in regions where water is scarce. They are also focused on changing the perception of public toilets, transforming them from being seen as dirty and unhygienic to being recognized as clean, modern facilities that contribute to public health and environmental sustainability.

12. Website/Application details

Website	www.basicshit.org
Blog Post: Humble Toilet installation at Vanphool School	https://www.basicshit.org/post/humble-toilet-installation-vanphool-school
Blog Post: Majnu Ka Tila Women's Toilet	https://www.basicshit.org/post/case-study-majnu-ka-tila-women-s-toilet
Farmer Protest: BasicShit constructed eco-friendly toilets at Singhu Border	https://www.youtube.com/watch?v=UZ8auLKoZqw&t=2s
The Quint Coverage on BasicShit's toilet construction at Singhu Border	https://www.youtube.com/watch?v=ia0AoP4T2fs
BasicShit Toilets at Ziro Festival 2019	https://www.youtube.com/watch?v=KvPx34FkjQA

7.12

Code Effort Pvt Ltd

Cigarette Butt Recycling

1. Programme Overview

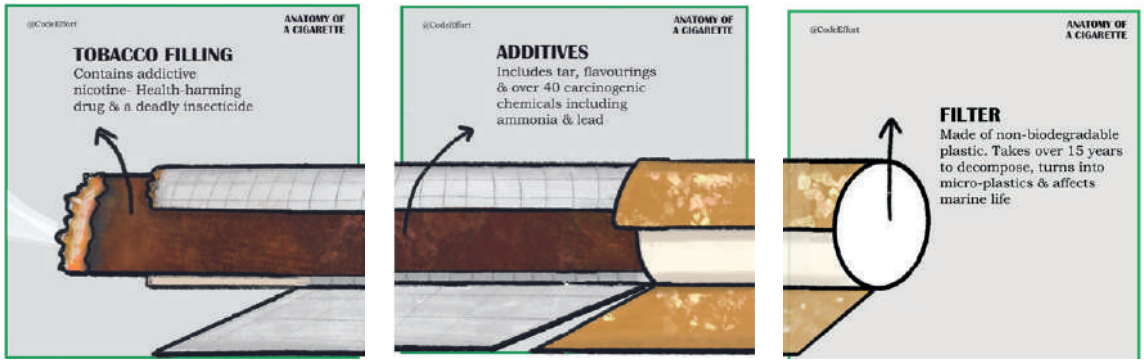
Naman Gupta and his elder brother Vipul Gupta started Code Effort Private Limited on 25th September 2018. He came across the problem of cigarette butts in their native city, Noida. In 2018, Mr. Naman Gupta witnessed the huge number of cigarette butts ending as general litter in his environment. This increased his curiosity about understanding the after-life of cigarette butts, and led him to develop an end-to-end solution to efficiently recycle cigarette butts into multiple products - such as home decor, toys, and more.

2. Relevance

Cigarette waste is a non-biodegradable waste comprising cellulose acetate and that takes more than 10 years to decompose. A single cigarette butt can contaminate over 500 ml of water and contains more than 50 toxic chemicals that can harm marine and aquatic life if leeched into the environment. A whopping 6.5 trillion cigarette butts end up as litter making cigarette butts the topmost littered item worldwide. Also, one kilogram of cigarette waste contains over 3,500 cigarette butts.

The cigarette butt itself was invented in 1960 – 1970 as a promotional feature by cigarette manufacturers that was later made mandatory for various reasons. In India, there have been no specific guidelines or regulations for appropriate cigarette waste management and recycling, and thus, providing an end-to-end solution to this alarming problem became the inspiration to launch Code Effort Private Limited in 2018.

Image 1: Anatomy of Cigarettes



3. Detailed Programme Description

Code Effort has developed a 3P model to provide an end-to-end solution to the problem of cigarette butts. The 3P model is as follows:

- **Procure:** The collection/procurement of cigarette butts is the first and continuous step of the 3P model. Code Effort mobilizes 2,500+ rag-pickers across 250+ districts across India to collect cigarette butts. They incentivize the rag-picker community to maintain a fair and motivating trade relationship with Code Effort. This fosters livelihood opportunities for the rag-pickers while simultaneously helping Code Effort increase its cigarette butt collection rate.

  Code Effort also implements cigarette waste collection projects for commercial establishments to maximize procurement and spread awareness among smokers and the general public.

  Some of these projects include installing VBINS (Value Bins) at cigarette vendors and smoking areas of commercial establishments. VBINS is a Code Effort registered brand name for cigarette waste receptacles. Since 2018, Code Effort has installed 200,000+ VBINS across India.

  VBINS helps in ensuring segregation at source, 24x7 public awareness, pushing for consumer behaviour change, avoiding general litter, increasing brand visibility and customer acquisition, and generating revenue through VBIN sales.

- **Process:** The processing/recycling of cigarette butts is the second and core step of the 3P model. Code Effort has an in-house, carbon-neutral, NET ZERO, automated, and 100% Made-In-India recycling process that ensures 100% utilization of raw materials, reduces GHG emissions, controls pollution, and fosters a circular economy. Code Effort technology recycles all the components of cigarette butts.

- **Produce:** The production/manufacturing of finished merchandise is the third and revenue-oriented step of the 3P model. Code Effort manufactures home decor, gift items, sculptures, soft toys, textiles, and yarns from the fibre (cellulose acetate). They manufacture mosquito repellents and recycled paper from cigarette paper. They also manufacture compost powder from the leftover tobacco and ash.

Code Effort also offers commercial opportunities for individuals, SMEs, and NGOs to trade cigarette butts in exchange for monetary benefits via The Code Association. Code Associations are territory-based agreements between Code Effort suppliers (called associates). These agreements are classified into city, district, and state agreements. Current active associations include 124 city associations, 85 district associations, and 3 state associations.

Additionally, Code Associations contribute to the procurement of cigarette butts across India. Around 1.5 tonnes of cigarette butts are procured daily through this initiative. This model has helped Code Effort focus on the processing and producing aspects to maintain continuous recycling and manufacturing of finished merchandise.

Code Effort also welcomes volunteers to send or donate their cigarette butts for recycling. Every volunteer gets gifts and incentives for their support.

Image 2: Code Effort factory worker wearing protective gear while recycling cigarette butts

Impact Created:

Through its initiatives, Code Effort has positively impacted the environment, society, and the economy. They have created the following impact:

For the Environment

1. More than 10 billion cigarette butts procured pan India have been recycled.
2. Approximately 250 billion litres of usable water has been saved from contamination and toxic leachate.
3. Millions of marine species have been saved from life-threatening situations (caused at the time of ingestion); and
4. 400 billion grams of CO2 has been offset from the environment.

For Society

1. 200,000+ cigarette waste disposal receptacles (VBINS) have been provided across India to foster segregation at-source.
2. Behaviour change has been fostered among millions of consumers; and
3. Help has been provided to aid people to quit smoking.

For the Economy

1. 2,500+ BPL, marginalized, and unemployed citizens have found an income source through Code Effort.
2. 100+ women and local artisans have also found an income source through Code Effort; and
3. Through affiliation, collaboration, employment, and purpose-driven projects, Code Effort has been able to provide a host of opportunities to the youth of India.

Expected Outcomes:

Cigarette and cigarette filter market demand is expected to grow to USD 1,200 Billion (CAGR 6.6%) and USD 50 Billion (CAGR 6.5%) respectively. In this regard, Code Effort is a growing company and witnessing a 6x growth year-on-year since 2018.

4. Smart Solution

Code Effort recycles cigarette fibres using biodegradable and organic chemical compositions. After treatment, the materials undergo a quality and lab testing process before further application. Code Efforts has a closed-loop recycling process that ensures 100% utilization of the materials, NET ZERO carbon footprints, and fosters a circular economy. Its recycling process is GRS, ISO 9001:2015, ISO 14001:2015, and ISO 45001:2018 certified – followed by regular quality checks.

Code Effort utilizes the recycled fibres as stuffing inside hand-made accessories, artefacts, cushions, furniture items, gift items, mattresses, pillows, textiles, toys, yarns, and many more. The tobacco is decomposed using 100% natural microorganisms and converted into compost powder. Code Effort's composting is aerobic – unlike traditional anaerobic processes to ensure that the leachate doesn't harm the soil and groundwater. The paper is ground into a pulp and later formulated into mosquito repellents using specialized ingredients and fragrances. Moreover, recycled cigarette paper products are also being developed into items such as stationery, packaging, and more. The USP is primarily to upcycle cigarette waste into valuable products.

Code Effort recycled paper products (brochures, packaging paper, envelopes, letterheads, diaries, notepads, and more) includes features such as:

- Customized thickness starting from 120 GSM to 450 GSM
- The standard sheet size of 30x20 inch - sizeable as required
- Colour as required
- Shelf life of 2+ years
- Plant-able; and
- Recyclable up to 8 times

Image 3: Products like envelopes, keychains, pillows, bags, paper, and hand-woven fabrics created from recycled cigarette butts

5. Financial/Revenue Model

Code Effort is a self-funded organization. They have received grants and prize money by participating in programmes operated by incubators, accelerators, and the government. They have not raised any external equity or debt funding from VCs and investors.

Code Effort is proud to have their customers and clients as their primary stakeholders-cum-investors who back them by procuring Code Effort products and services. They have been profitable for the last three financial years.

6. Partnerships

Code Effort operates in partnership with:

Five global NGOs with a team of over 15 million across India: As NGOs and volunteering groups have massive outreach and can implement awareness and procurement activities, Code Effort collaborates with them as a part of the procurement process (the first step of the 3P model).

Corporate companies: They are a source of revenue for Code Effort. Code Effort acts as their supplier of gift items, recycled paper, soft toys, textiles, and yarns as per PO and bulk orders raised. This is a part of the production process (the third step of the 3P model).

Code Effort is currently building a D2C platform to fulfil orders of individual and conscious consumers and increasing brand engagements.

7. Programme Amplification

The 3P model is an example of the values and ethics that Code Effort incorporates into its implementation activities as an organization. In 2018, the cigarette waste management and recycling industry did not exist. Code Effort has made these systems a reality today. They built their model through the feedback and requirements of their clients, customers, suppliers, and other stakeholders. This approach makes the business model of Code Effort sustainable and replicable in multiple geographies.

The team prioritizes addressing their clients' needs, desires, requirements, and feedback that feeds into shaping the Code Effort business and offerings towards maximum results, longevity, and meaningful relationships.

Code Effort has also provided their technology to Bangladesh, Malaysia, Nepal, Singapore, and Vietnam through a joint-venture agreement. The team is currently exploring the European and African markets and expect to replicate their model by 2026. Currently, Code Effort is working on a built-to-suit model.

8. Challenges Encountered and Overcome

Since 2018, the challenges and solutions that Code Effort has engaged in are as follows:

- **2018 to 2021:** Code Effort is the industry pioneer of cigarette waste management and recycling in India. As industry pioneers, awareness was the biggest challenge due to inadequate regulations, resources, and knowledge. Code Effort continuously invested in awareness activities and worked closely with volunteers, NGOs, and the media. These activities helped Code Effort sensitize 500 million+ people across India and create a movement in the cigarette waste recycling business.
- **2021 to 2023:** Lack of industry connections was a challenge, Code Effort faced issues due to inability to optimize the quality and costs of their finished merchandise. To solve for this, Code Effort built a team of 100+ rural women artisans to manufacture the finished merchandise in-house. Moreover, Code Effort partnered with existing large-scale mills to speed up the production and volumes of finished merchandise.
- **2023 to 2025:** The demand for sustainable and eco-friendly merchandise is at an early stage and growing. Code Effort's solution is to partner with MNCs and Fortune 500 companies to generate B2B and bulk orders for their finished merchandise. Today, Code Effort is a registered vendor to 50+ corporate companies that procure Code Effort finished merchandise for regular, self, and commercial consumption.

9. Website/Application Details

Website	https://www.codeefforts.com

7.13

PadCare Labs

Menstrual Waste Management

1. Programme Overview

PadCare Labs is a start-up on innovative solutions around absorbents, disposal and treatment with a focus on menstrual waste management strategies. They have been in operation since 2018 with the objective to ensure every used sanitary pad is recycled by providing safe and hygienic disposal mechanisms.

Menstrual waste management has traditionally presented itself as an environmental hazard to waste workers and a public health concern. PadCare Labs initiative, PadCareX Recycling Machine, prevents manual handling of used sanitary pads, thereby maintaining the dignity and health of waste workers.

2. Relevance

According to the World Bank, in India, approximately 121 million women use sanitary pads. Unfortunately, most used pads end up in the landfills, posing a significant threat to the environment. According to a study, sanitary pads can take almost 500-800 years to decompose meaning every pad ever used still exists in the ecosystem. Additionally, sanitation workers often manually handle menstrual waste, compromising their health and dignity.

While traditional waste management practices include landfilling and incineration, PadCare Lab's ecosystem allows for source segregation of sanitary pads and recycling of soiled pads. Currently, PadCare Labs is operational in 22 cities across India, including Pune, Mumbai, Bangalore, and Delhi

3. Detailed Programme Description

PadCare aims to solve the Menstrual health and hygiene problem holistically through -

- **Awareness:** Spreading awareness around menstrual health and hygiene and breaking the taboo around menstruation.
- **Accessibility:** Installing PadCare Vend, a dispensing machine of sanitary pads that the user can access in case of any emergency requirement.
- **Segregation:** PadCare ensures there is source segregation of the pads through PadCare bins, which are installed in female washrooms and allow for safe and hygienic disposal.
- **Recycling:** PadCare Labs has developed a unique chemo-mechanical process to decompose and segregate the materials in used sanitary pads. This patented 5D technology powers a machine that efficiently processes used sanitary pads into recyclable materials. The recycled output includes wood pulp and plastic, which are further sent for processing to different recyclers and processed into various products. Wood pulp and plastic are further sent for processing to different recyclers. Wood pulp is used to manufacture paper and packaging products like stationery, while plastic is transformed into paver blocks and plastic granules. Currently, PadCare Labs is also exploring applications in the chemical and textile industries.

Image 1: Products like calendars, bags, and plant pots made from recycled menstrual pads

- The PadCare bins are equipped with PadCare VAP technology, which stores pads in the bin for 30 days without any odour or bacterial growth. technology, which stores pads for up to 30 days without odour or bacterial growth. Collection frequencies are tailored to client needs, ranging from weekly, biweekly to monthly collections. The EHS (Environment, Health & Safety) trained service team visits the client locations and collects the pads and transports them to the recycling station.
- Recognizing that cultural taboos and lack of knowledge often hinder proper disposal practices, PadCare partners with local NGOs to conduct targeted outreach and education. Through workshops, informational sessions, and interactive campaigns, the IEC educates communities on the environmental and health impacts of sanitary waste, emphasizing the benefits of PadCare's sustainable disposal methods.

Thus far, PadCare Labs has recycled 4.9 million pads and conserved 249 MTs of CO_2 equivalent to date.

4. Financial/Revenue Model

PadCare generates revenue through three primary streams: service fees, sale of sanitary pads, and the sale of recycled products. The company's service fees, its main revenue generator, are charged on a "Per Bin, Per Service" basis, meaning organizations are billed based on the number of bins and frequency of services. PadCare incurs initial costs related to production, installation, and machinery. The O&M costs primarily involve machine upkeep, bin replacement, and logistics for the collection and recycling processes.

Image 2: The PadCare Labs Ecosystem

5. Partnerships

PadCare Labs partners with B2B (Business to Business) and B2G (Business to Government) sectors, including corporate offices, educational institutions, offices, government schools and ULBs to make its work possible.

6. Programme Amplification

PadCare Labs' approach addresses both environmental and social sustainability. By reducing the volume of sanitary pads in landfills and conserving CO2, the initiative significantly mitigates environmental impact. The start-up has significantly reduced the volume of waste directed to landfills by recycling 3.4 million pads. It has also conserved 174 MTs of CO2. Additionally, by preventing manual handling of menstrual waste, PadCare Labs safeguards the health and dignity of waste workers, promoting better working conditions and social equity.

Currently, PadCare Labs' recycling machine operates in Pune. Plans are underway to establish zonal recycling stations in Bangalore and Delhi to optimize transportation and expand reach. Additionally, PadCare Labs aims to scale their operations globally, enhancing their impact on menstrual waste management worldwide.

By innovating in menstrual waste management, PadCare Labs exemplifies how startups can drive environmental and social change through sustainable practices and technological advancements. The technology can be scaled up under Swacch Bharat Mission for proper disposal of sanitary pads.

Image 3: PadCare Labs in Housing Societies

7. Programme Monitoring and Evaluation

Field audits and feedback loops are integral to the Monitoring and Evaluation (M&E) process, gathering input from both the on-ground team and programme participants. This approach enables PadCare to identify challenges, such as logistical inefficiencies or community adoption issues, in real-time. The Customer Success Team plays a critical role in this process by conducting regular audits to assess programme performance, addressing operational issues, and identifying areas for improvement.

To facilitate course correction, the Customer Success Team engages directly with clients to gather feedback, ensuring that the programme aligns with client needs and expectations. This proactive approach allows PadCare to promptly address any challenges

Image 4: PadCare Labs Founder, Mr. Ajinkya & the PadCare Labs Team

8. Challenges Encountered and Overcome

PadCare Labs faced many challenges in executing their mission towards making menstrual waste disposal and management safe and hygienic. Most notably, these challenges included:

- **Approvals for Recycling Technology:** Introducing a new recycling technology required multiple clearances from regulatory authorities. This was a time-consuming process for PadCare.
- **Source Segregation with Urban Local Bodies (ULBs):** Collaborating with ULBs for the segregation of sanitary pads was challenging, as it required aligning municipal waste management practices with PadCare's specific needs.

9. Website/Application Details

Website	https://www.padcarelabs.com
PadCare Labs Initiative for Dignity, Sustainability, and Health video	https://www.youtube.com/watch?v=HhPvzxICyf4
PadCare Labs featured by World Economic Forum video	https://www.youtube.com/watch?v=I0ZvlFcMwcI

7.14

ReCircle

ClimaOne

1. Programme Overview

Today, society finds itself at the precipice of multiple climate crises, with everyone having long been a part of the problem. There is an urgent need to drastically reduce waste and embrace resource recovery as a bold environmental solution.

This was the driving force behind ReCircle's launch of its flagship initiative ClimaOne in 2023. ClimaOne equips businesses, informal collectors, and processors across India with technology tools necessary to optimize recycling, ensure compliance, and close material loops within the waste management value chain. The programme addresses existing challenges in the ecosystem by creating a unified, transparent, and traceable platform that provides real-time tracking powered by data and analytics. It enables businesses to monitor their waste streams from source to recycling in real-time and simplifies reporting and compliance. This cutting-edge solution is designed to drive waste management supply chain transformation and foster a circular economy through unprecedented transparency.

2. Relevance

The recycling sector faces formidable challenges such as supply chain inefficiencies, limited transparency and a lack of data-driven insights. To address these challenges, ReCircle developed ClimaOne. ClimaOne brings clean-tech innovation to the recycling sector through a digital platform embedded with traceability, data capabilities, and analytics that brands across industries can leverage.

The initiative redefines how waste materials are managed. It offers a seamless supply chain navigation tool, with user-centred and earth-centred features, to brands, waste collectors, and processors. The tool supports them in their sustainability journey.

ClimaOne allows businesses to follow and trace their waste through the waste management supply chain from collectors to processors. It allows them to verify where the waste is coming from, how the waste is processed and reused, and whether the waste is appropriately recycled. Thus, this initiative enables accountability among brands that purchase plastic and EPR credit and helps businesses meet compliance requirements and achieve their Sustainable Development Goals (SDGs). The programme therefore brings all waste management stakeholders on a single platform and helps them manage new pathways to waste reduction and resource optimization.

In its next version, ClimaOne will provide waste-to-product traceability by tracking the recycled material to the final product stage in the recycling process.

3. Detailed Programme Description

ClimaOne brings transparency to the plastic waste supply chain, providing PIBOs and FMCGs like Coca-Cola, Hindustan Unilever, Dabur, and Mondelez with ethical and data-driven insights. The initiative was launched with the intention of utilizing technology to solve the existing challenges in the resource recovery ecosystem across India.

ClimaOne streamlines the tracking and management of plastic credits through a compliance dashboard, offering users real-time insights to optimize EPR compliance and achieve plastic neutrality. The digital platform also provides features such as efficient real-time certificate tracking, query resolution, reporting, and data visualization. This enables brands to improve their perception value among stakeholders, especially among customers who are increasingly purchasing from brands based on their sustainability credentials.

For processors, ClimaOne offers vehicle tracking, inventory management, simplified certification validation, data availability features, and comprehensive record-keeping via audit logs and ledger systems. Whereas, for collection partners, it provides access to a dual-language mobile application that seamlessly integrates with the processor and brand portals on the digital platform to maximize reach and traceability. Tools such as geo-location tagging are also available, which enhances security and improves income opportunities. Additionally, ClimaOne has a simple registration process. This allows for easy onboarding and alignment with EPR compliance requirements.

Image 1: Dry waste collection vehicles

The proprietary clean-tech platform was developed with support from GSMA and UKAid. Since its launch, ClimaOne has enabled seamless connectivity among stakeholders, that is, with businesses, informal collectors, and processors, while simultaneously providing a transparent reverse supply chain for plastic waste and ensuring that collected plastic waste moves towards a circular economy.

The larger goal is to make India's resource management more responsible, traceable, transparent, and organized by shifting perspectives and opening new pathways through technology and innovative systems.

Image 2: ReCircle waste workers segregating waste

4. Smart Solution

ClimaOne's platform features are user-centred and innovative, making it possible to re-engineer the way the waste management supply chain operates towards a simplified sustainable recycling journey. The initiative enables brands, through the platform's many features, to move away from manual processes and guesswork. It also offers integration into the CPCB Dashboard.

For Processors, the various digital features of ClimaOne enable access to a reliable supply of high-quality scrap materials, unlock new revenue streams, and provide them the opportunity to contribute to a circular economy.

The dual-language app for Collection partners is an empowerment tool that helps them to seamlessly work with processors and brands in the waste management supply chain, helps them to effortlessly connect with key stakeholders in the ecosystem, and provides them with protection measures against transaction fraud.

The biggest differentiator of ClimaOne is its business model. While traditional interventions have collectors engaged as traders or as a marketplace earning small profit margins that does not motivate collectors to be formalised, the business model of ClimaOne – being a data solution offered as a service in a supply chain company – attracts each stakeholder in the waste management ecosystem, including informal collectors, to get digitized and absorbed into ReCircle's formal supply chain.

Image 3: Plastic bottle segregation

5. Financial/Revenue Model

ReCircle is a B2B operation with an inclusive, asset-light model that stands apart from traditional marketplace models. It partners with local waste collectors across India, integrating them into its supply chain to formalize their role. These collectors assist in aggregating plastic waste, which is in-turn directed toward recycling.

Using the ClimaOne platform, ReCircle tracks this material and converts it to plastic credits, which are sold to FMCG companies and PIBOs. ClimaOne generates revenue through the sale of these plastic credits, and a portion of this revenue is passed on to the collectors, leading to their formalization.

As such, ReCircle has diversified its revenue streams to ensure a robust financial model. This includes:

- Extended Producer Responsibility Services
- Plastic Neutral Programme Services
- Trading of Scrap Materials
- Material Recovery Facility (MRF)
- Zero Waste Events and Collections Drives

Regarding ClimaOne in particular, there are two main revenue models:

Sale of plastic credits: Brands pay a per tonne fee for the plastic credits that are sold to them. They purchase from two types of plastic credits – Non-Recyclable and Recyclable. Currently, brands like HCCB, Dabur, Mondelez, PepsiCo, and Samsung are engaged in purchasing plastic credits from ReCircle.

Sale of Scrap to recyclers: Revenue is generated by selling collected scrap materials to recyclers. Currently, ReCircle operates a collection centre in Mumbai for this purpose.

Image 4: ReCircle waste workers

Additionally, ReCircle received a grant from GSMA to support the development of ClimaOne. This grant will be used to further the ReCircle mission of promoting an ethical and inclusive circular economy, of enhancing ClimaOne traceability platform, and improving the lives and livelihoods of waste pickers.

6. Programme Amplification

With the current version of ClimaOne, ReCircle tracks the plastic waste from collectors to recyclers in the recycle value chain and converts it into plastic credits for sale to brand owners. As a part of its growth and diversification strategy, ReCircle is committed to advancing ethical circularity, and plans to forward integrate into the plastic waste supply chain.

ReCircle aims to track plastic waste post-recycling and reintroduce it into the supply chains of brands as ethically sourced, traceable materials in their packaging. The social enterprise aims to do this by leveraging its pan India network of partners, built over the last eight years. This forward integration is expected to help brands meet their SDG and EPR commitments. It is also expected to provide full traceability from the source of waste collection to the final packaging product, bringing ReCircle closer to its vision of ethical circularity.

7. Information, Education & Communication (IEC) Model

ReCircle regularly conducts Information, Education, and Communication (IEC) activities across various cities, alongside consumer awareness efforts through collection drives, zero-waste events, zero-waste office initiatives, and social content. These efforts aim to raise awareness on waste segregation, recycling, and environmental conservation that fosters community engagement and participation in waste management practices.

Additionally, ReCircle works to formalize the informal waste management sector by organizing medical camps, facilitating bank account opening, and connecting workers to government support schemes. Through these initiatives over 3,100 Safai Saathis have been positively impacted. Support is also drawn from companies towards these efforts.

During the implementation of ClimaOne, ReCircle faced significant challenges with onboarding Safai Saathis due to their limited familiarity with technology and the formalization process. ReCircle overcame this by conducting IEC activities with them to boost their knowledge in material identification, including Low-Value Plastics (LVPs), and the use of technology.

Further, ReCircle actively promotes awareness via its social media channels. Through these engagements, ReCircle is looking to encourage consumer participation in waste management practices. Recently, a Diwali waste collection drive in Mumbai led to the collection of over 45.6 tonnes of material from across the city.

8. Programme Monitoring and Evaluation

ReCircle has established an internal Monitoring and Evaluation (M&E) plan. They also collaborate with external stakeholders to validate their progress. While their finance team monitors the financial performance, a dedicated impact team evaluates the positive outcomes generated by ReCircle's initiatives.

Image 5: Transportation of waste

9. Challenges Encountered and Overcome

Initially, ReCircle struggled with finding a strong foothold, building a cohesive team, and expanding its client portfolio. However, once processes were refined and key obstacles were addressed, the organisation witnessed rapid growth.

The most significant hurdle that ReCircle faced was securing equity capital from VC funds. They encountered this challenge as many investors were either not focused on the waste management space or did not fully comprehend ReCircle's business model, given the fragmented nature of the industry. Financing the ClimaOne platform posed additional difficulties for the same reason. Despite being cash flow positive and experiencing steady growth, ReCircle was facing challenges in raising the necessary equity capital for scaling the organization.

In 2023, ReCircle was able to meet their financial needs by securing support from Flipkart Ventures, Acumen, and 3iPartners to drive growth. In 2024, a bridge funding round was completed with investments from Venture Catalysts, Mumbai Angels (a wholly owned subsidiary of 360 ONE WAM Limited, formerly known as IIFL Wealth Management Limited), and high-net-worth individuals (HNIs). The GSMA grant specifically supported the development of the ClimaOne technology platform.

The coming months of 2024 and 2025 are pivotal for ReCircle, as they are focused on diversifying their offerings, expanding their impact, launching their own recycling unit, building their team, and fully leveraging ClimaOne.

10. Website/Application Details

Website	https://recircle.in
QR Code	https://drive.google.com/file/d/16_WKnT6VhgWohtOcb6yaPy_DcRNvZzYS/view
ClimaOne: Revolutionizing Waste Management	https://www.youtube.com/watch?v=gvRUTwxUqT4&t=15s
Impact created	https://recircle.in/impact/
Impact report	https://heyzine.com/flip-book/70a09aca6a.html

7.15

Udupi Zilla Panchayat

Rural Circularity Solution

1. Programme Overview

At present, all Udupi Gram Panchayats are focused on dry waste collection and its scientific disposal. To encourage the Panchayats towards plastic waste recycling, Saahas Zero Waste and Mangala Resource Management Private Limited lent their expertise to Udupi Zilla Panchayat for the implementation of the first Material Recovery Facility (MRF) in the community.

2. Relevance

Under SBM-G, Udupi district holds the distinction of being the first district in Karnataka to proclaim the entirety of the district as Open Defecation Free. During the 2017-18 financial year, Udupi was ranked at the top of the Swachhata Darpan rating by the then Ministry of Drinking Water and Sanitation. The district recognized that changing people's attitudes regarding waste was the first step toward solving the garbage problem.

Udupi District has also been credited for launching the first SLWM centre in Karnataka in 2017. Additionally, the district is credited for introducing the concept of converting waste into resources. It has further been able to transform its waste disposal process into an economic activity with the help of SHG members. The district was the state's first self-sustaining waste management model through SHG's. This system created employment opportunities for nearly 600 rural women. It also led to the creation of a reliable garbage collecting system in rural areas for successful management of the waste generated in the villages. It is to be noted that all 155 Gram Panchayats in Udupi have initiated segregated waste collection.

However, SLWM centres at Udupi district had low sorting efficiency with 30 kg to 40 kg of waste being sorted per person per day. Only high value recyclable items were able to be sold, as scrap dealers offered low rates for recyclable materials. Additionally, there was not enough space to store materials for long periods, and not many options were available to dispatch non recyclables and low value items. Hence, Gram Panchayats shifted their focus to dry waste collection and its scientific disposal, including plastic waste collection and recycling. To facilitate this, an MRF was introduced by the Udupi Zilla Panchayat, the first of its kind in rural Karnataka.

3. Detailed Programme Description

Setting up the MRF unfolded in five stages starting from surveying for suitable land and bidding for construction to operationalizing the facility. The five stages included:

Survey and Planning: This involved identification of the land, verifications and approvals of the land documents for SWM. Additionally, Gram Panchayats were mapped and a stock taking exercise of the waste was conducted.

Preparation of a detailed Project Report: A report on the data collected, definitions of the capex, operating expenses, and detailed estimates were compiled into a Project Report.

Capacity Building: The collection infrastructure was optimized, and the awareness activities along with the IEC initiatives were undertaken at this stage.

MRF construction: At this stage, tenders were floated for an MRF shed and Equipment Bill of Quantities (BOQ) requesting for quantities and specifications of materials, labour, and equipment required for the MRF construction. Upon successful bidding, the machinery was commissioned.

MRF operations: For getting the MRF operational the winner of the bid is provided training and handholding in operation.

Image 1: The MRF in Nitte Gram Panchayat, Karkala Taluk, Udupi District, Karnataka

As the MRF was intended to be a permanent fixture, the MRF was entrusted to Mangala Resource Management (a start-up of Ramakrishna Mission, Mangalore) for three years. They won the bid in May 2021 by quoting the lowest service fee. A year after commissioning the project, the service fee was revised, and the operator began collecting nominal fees from the GPs for transportation only.

The MRF was constructed over two acres of land in Padvu of Nitte Village, Karkala Taluk, Karnataka. Currently, it has the capacity to segregate 10 tonnes of plastic per day. Three conveyor belts have been included – one on the shop floor, one on the inclined floor, and another on the mezzanine floor of the facility. The facility also includes a baler machine, weighbridge, and a seven-tonne capacity vehicle. Dry waste from 42 Panchayats reaches the facility and is segregated into 25-30 categories of waste. The MRF is made functional by around 25 staff in two shifts. Each staff can recover 150-200 kg of waste per shift. This is at least 4 times more than the SWM Centre.

The facility has resulted in maximizing resource recovery from waste and has led to bringing unorganized entrepreneurs into a formal supply chain. Better price realization has been created for reuse of cartons through the chain. PET bottles are able to get INR 18 per kg under the present system and bailed PET bottles INR 45 per kg. Incentives have also been introduced for supply of good quality recycled products like cartons. Living standards have also improved for all staff employed at the MRF. They are now able to envision a career in waste management. Additionally, the MRF has contributed to a reduction of open burning of waste, has increased waste traceability, and has ensured diversion from landfills. Non-reusable waste gets transported to cement factories for the purpose of co-processing. Digitalization has also been incorporated into the facility. Hence, there is proper maintenance and monitoring of waste records, vehicle movements, recycled items, dispatch details, and data on income and expenditure. Further, the facility has created safe equitable opportunities for women. This is being supported by policies to avoid any form of discrimination against their participation in the system.

Image 2: On-field implementation including segregation, cleaning of plastics, drying of recyclable items, and sale of such items




Image 3: Plastic formed Thande Kokkarne Road in Brahmavara Taluk, Udupi District

Around 35% of the waste that comes though the facility is that of Multi-Layered Plastic. This is the largest category of waste at the facility. Another 6% of the waste are rigid plastics, 5% are LVP, 4% are PET Bottles, 4% are PP Rafia, 2% are PP & LDPE. In total, plastic makes up 56% of all the waste that goes through this facility.

4. Smart Solution

The plastic that has been recovered has been recycled towards the formation of roads. Thus far, 42 tonnes of plastic waste have been used for the development of roads under the PMGSY scheme and under the GP for developing 20 km of road. In Brahmavara Taluk, Udupi District, the Thande Kokkarne Road has been constructed out of plastic. This initiative was undertaken in 2022.

5. Partnerships

The project is supervised by the Zilla Panchayat of Udupi. While Saahas Zero Waste Private Limited provides technical guidance for project implementation, the operation of the facility is handled by Mangala Resource Management Private Limited, Mangalore.

6. Programme Amplification

To amplify plastic waste recovery and recycling, three Plastic Waste Management Units (PWMU/Mini MRF) have been established in Udupi district. The first unit was inaugurated in 80 Badagubettu Gram Panchayat in the month of February 2023. This unit adopted a Pay Back Business model, which is a first in the waste management space. Baeru Environmental Service Pvt. Ltd. quoted the highest purchase rate for 1 kg of waste and thus emerged as the successful bidder. The other two units are expected to be operational.

7. Website/Application Details

Video	https://www.youtube.com/watch?v=7hjEvr71zZk
PIB	https://www.pib.gov.in/PressReleasePage.aspx?PRID=1794707

7.16

Aga Khan Foundation

Integrated Decentralized Solid Waste Management

1. Programme Overview

Aga Khan Foundation, supported by European Union, implemented a decentralised solid waste management (SWM) initiative in Danapur, Khagaul, and Phulwarisharif city councils of Patna in Bihar. The primary goal of the programme was to engage with ULBs to promote an environmentally viable and sustainable model for decentralized SWM with focus on plastic waste management that could be replicated and scaled up by other local authorities.

2. Relevance

The intervention was strategically designed to transform the solid waste management landscape in Danapur, Khagaul, and Phulwarisharif localities of Patna. There were three key focus areas for driving impactful change, namely:

- Developing ULB capacities and technical expertise in decentralized governance and sustainable Solid Waste Management (SWM) services.
- Introducing approaches and technologies to promote decentralization and sustainable SWM services with focus on plastic waste management.
- Integrating waste pickers into the waste management value chain and mobilizing citizen engagement towards planning and monitoring of SWM services for improved transparency and accountability.

The initiative was implemented in collaboration with local partner, Gram Swarajya Samiti Ghoshi (GSSG).

3. Detailed Programme Description

The programme adopted a comprehensive, multi-faceted strategy to address waste management, including plastic waste management, through various innovative and integrated approaches. These included:

Image 1: Community Awareness activities

- Setting up of a Central Material Recovery Facility (MRF) at Danapur, for further sorting and upcycling of plastic waste.
- Implementing community-led waste management initiatives, through extensive capacity-building processes and hand holding support for waste pickers to promote the segregation of plastic waste.
- Conducting awareness campaigns to encourage households towards waste segregation at source, thereby preventing plastics from ending-up in dump sites or water channels.
- Engaging with citizens to benchmark waste management services using innovative tools such as citizen report cards and the MoHUA promoted Swachhata App.
- Implementing targeted interventions in poverty-stricken areas and directly working with waste pickers to integrate marginalized groups into the formal waste management value chain.

Through continuous community engagement, capacity building, and the incorporation of technology solutions, the programme has demonstrated that an integrated solid waste management approach can efficiently address plastic waste management, mitigate climate change impacts, and bolster urban living conditions.

4. Smart Solution

The programme has brought about a substantial change and transformation in plastic waste management across Danapur, Khagaul, and Phulwarisharif through a series of targeted initiatives. These initiatives included:

- **Information, Education & Communication (IEC) Campaign:** In December 2021, the programme called for the Foundation to spread public awareness regarding minimizing the use of single-use plastic on account of the Government of Bihar enforced a ban on production, import, storage and distribution of SUP. As a member of the state advisory committee on plastic waste management, Aga Khan Foundation launched an awareness drive in close collaboration with the State Pollution Control Board. Community members were made aware of the harmful effects of plastic through this drive and via wards, public spaces, and SHGs. They were instructed to be more conscious regarding plastic disposal and were advised against improper practices.

Image 2: Waste collection vehicle with different bins for dry and wet waste

- **ULBs as key drivers towards improving waste management services, specifically for plastic waste management:** To avoid the accumulation of single-use plastics in large quantities, that take years to decompose, Urban Local Bodies (ULBs) of Danapur, Khagaul, and Phulwarisharif deployed compartmentalized waste collection vehicles that ensured separation of dry and wet waste throughout the collection process. This prevented mixed waste from entering the value chain resulting in a more efficient system of waste management. These vehicles, combined with educational campaigns, led to an increase in source segregation rates with approximately 72% of households now actively participating.
- **Technology integration:** GPS-enabled waste collection vehicles were utilized in the initiatives by Aga Khan Foundation. This greatly improved plastic waste collection practices as this allowed for real-time monitoring, leading to route optimization and consequently, increased accountability among ULBs. This technological integration underscores the ability of the ULBs to embrace impactful innovations for their benefit. Door-to-door waste collection has reached 100% with the introduction of tracking technology in the programme.
- **Material Recovery Facilities (MRFs):** The establishment of Material Recovery Facilities (MRFs) in Danapur was pivotal towards the improvement of SWM and PWM in the community. Initially supported by the programme and now managed by the ULB, the MRF plays a critical role in meticulously sorting waste, and enhancing the value of collected plastic waste through shredding. The following steps were adopted at Danapur MRF Centre to streamline PWM in the locality:

a) **Pre-treatments and storing of both high and low-value plastic recyclables:** Once the collected waste reaches the Danapur MRF, the plastic waste is carefully sorted by trained workers manually. The segregated plastic materials are then stored based on the type of plastic, the grade of the plastic, and the colour of the plastic. These details are noted and entered into the database register.

b) **Processing and recycling:** After the pre-treatment, select categories of plastic waste undergo further processing – shredding and baling. As indicated in Table 1, baling and shredding significantly boost the monetary value of plastic and allow it to be sold off to recyclers for transforming into a valuable products or raw materials.

Table 1: Increased value of plastic waste post segregation, baling, and shredding

Type of plastic waste	Cost after segregation (INR per kg)	Cost after baling (INR per kg)	Cost after shredding (INR per kg)
White natural	50	-	70-80
Block natural	15	-	25
Polypropylene (PP)	20	-	30
Low-Density Polyethylene (LDPE)	30	-	50
PET bottle	25	40	-
Milk plastic	10	20	-
Oil plastic	10	20	-
Single plastic (HM)	10	20	-

Installing an MRF is a promising route to reduce the amount of plastic waste going to landfill sites. They offer effective resource recovery and livelihood opportunities to entrepreneurs, informal workers, and SHG members. Most importantly, they have the potential to become self-sustaining models that reduce overall carbon footprint and contribute positively to a circular economy.

- **Inclusive and community focused approaches:** The initiative has also nurtured a network of Citizen Leaders trained in advocating for improved waste management services and minimizing the use of single-use plastic. This type of community participation was made possible through awareness campaigns, inclusion of waste pickers, and improving livelihoods of marginalized groups.

Public hearings emerged as an effective platform in which residents actively participated in planning, monitoring, and addressing the challenges of SWM in their communities. By fostering open discussions and community engagement, these efforts ensure that local concerns are recognized, thereby cultivating a sense of ownership and responsibility among community members regarding their environment. The programme has also prioritized service expansion to underserved areas, as well as equal pay for women waste collectors and their promotion to leadership positions in SWM.

5. Financial/Revenue Model

The Solid Waste Management initiative provides a blueprint for sustainable SWM and PWM through its focus on financial sustainability, community engagement, and knowledge sharing. Financial sustainability is at the heart of the programme strategy with the aim of turning waste and plastic waste into valuable sellable products.

The MRFs are also a crucial component in this endeavour, as they recover the value of unrecyclable plastic material making them fit for resale. In this way, the programme is able to diversify its income sources and reduce dependence on a single funding stream, thereby steering the initiative towards long term success.

Image 3: Baling process

6. Programme Amplification

Plastic waste remains a significant global challenge, and the SWM and PWM initiatives by the Aga Khan Foundation have made notable strides in addressing it. By implementing integrated strategies of community mobilisation, awareness creation, ULB accountability building, and bringing efficiency to waste segregation and resource recovery through innovative solutions, the programme has laid the groundwork for a sustainable and financially viable system that can be replicated in other cities.

7.17

3R Solutions

Circular Economy for Plastic Packaging

1. Programme Overview

3R Solutions, launched in 2003, focuses on creating a circular economy model for plastic packaging in the paints and lubricants industries via the reuse of plastic containers. By reusing these containers, the initiative reduces the need for virgin plastic, leading to lower carbon emissions and preventing water contamination. It is a cost-effective solution compared to purchasing new packaging; that contributes to the reduction of plastic waste and ensures compliance with regulatory standards.

This approach is implemented by 3R Solutions in collaboration with paint and lubricant companies, waste picker organizations, and waste aggregators. They work in partnership towards converting single-use rigid plastic packaging into reusable assets. The start-up is aiming to scale this model nationally in order to drive sustainable change in industrial packaging.

2. Relevance

3R Solutions is addressing the risk that single-use packaging poses to the environment. The use of single-use packaging leads to resource inefficiencies as they are not appropriately disposed of by consumers thereby exacerbating environmental issues. They are termed as post-consumer plastic waste. In India, around 32 MTs of plastic is generated annually, of which a significant portion comes from single-use packaging. Hence, to mitigate further environmental impact, the organisation is offering solutions to both national and industry-specific challenges in managing this packaging. They have developed a more efficient system to recover, recondition, and reuse it. This approach supports companies in achieving compliance with regulations while simultaneously reducing their environmental footprint.

3. Detailed Programme Description

To convert single-use rigid plastic packaging into a sustainable, reusable resource, the initiative focuses on the following aspects:

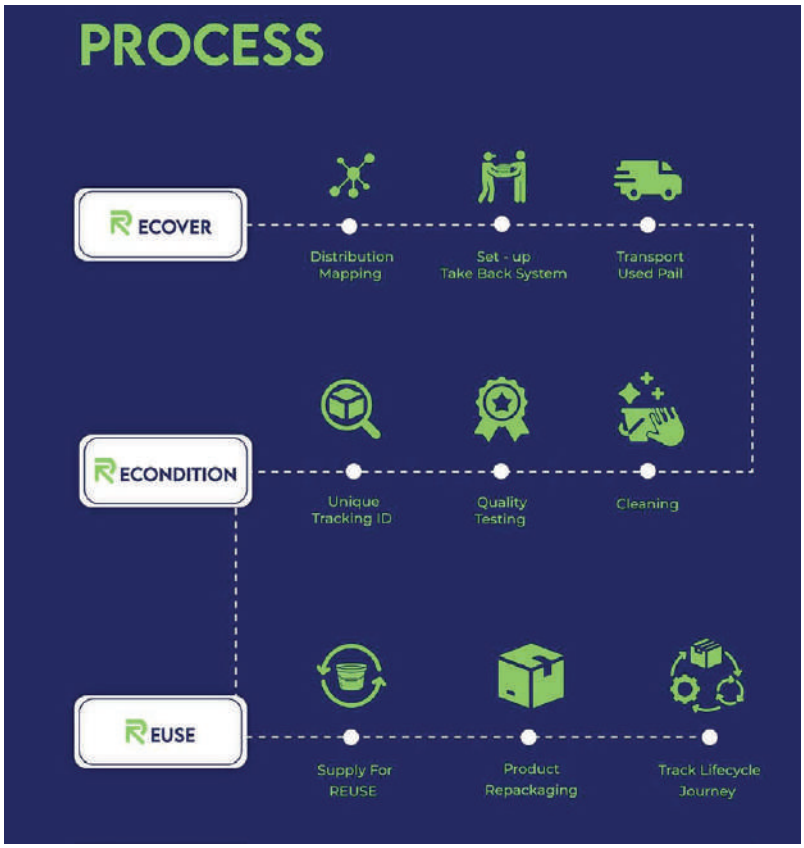
Purpose and Design: The team is focused on designing durable, reusable containers that can be digitally tracked and monitored throughout their lifecycle.

Geography: Currently the initiative is operational in Pune, with plans of expansion to other states.

Implementation Process: This includes partnering with companies to develop and establish take-back mechanisms, as well as, partnering with waste picker organizations to facilitate collection. The process also involves cleaning and reconditioning the containers at 3R Solutions' PCB-compliant units.

3R Solutions, along with its partner companies, initiates the conversion process by mapping the distribution of the product (containers) and establishing a take-back mechanism for used containers. These containers are thoroughly cleaned and quality tested using a patented process. Once cleaned, the containers are supplied to companies for reuse and digitally tracked through their lifecycle journey.

Image 1: Process of 3R Solutions



3R Solutions has successfully conducted pilot programmes that identified roadblocks and led to improvements in their digital tracking and reconditioning processes. To date, the start-up has contributed to the reduction of 1,500 kg of virgin plastic use, prevented 3,200 litres of water contamination, created jobs, and achieved ~3 MTs in carbon emission reductions .

4. Smart Solution

The programme's differentiator lies in 3R Solutions' patent-pending reconditioning process. It is regarded as a technological leap in packaging container lifecycle management. The process extends container lifespan and incorporates digital lifecycle tracking, ensuring clear and transparent monitoring for clients.

Unlike conventional systems, the intervention emphasizes eco-friendly cleaning conducted in controlled environments to prevent water contamination. This integrated approach facilitates cost savings and regulatory compliance. It also reduces dependency on virgin plastic thereby contributing to measurable environmental benefits.

Image 2: Reconditioning process

5. Financial/Revenue Model

The organisation primarily generates revenue through the sale of two products – reuse-ready containers and recycled polymer. Reuse-ready containers are reconditioned containers that are sold at a reduced cost, while recycled polymers refer to recyclates from recovered plastics. The cost structure of the initiative includes collection, cleaning, and digital tracking.

6. Programme Amplification

Long-term sustainability of 3R Solutions is expected to be achieved by facilitating operational savings for companies through the use of reusable packaging. The start-up is looking to demonstrate this through their pilots along with showcasing the impact their initiative can have towards reducing emissions and preventing water contamination.

In the short term (1-2 years), it is anticipated that forward-thinking businesses would adopt the 3R solutions early on. Cost savings from reduced packaging expenses is expected to encourage other businesses to adopt packaging reuse. The legal obligation of packaging reuse from 2025 is also expected to drive rapid adoption.

Over the medium term (2-4 years), 3R Solutions is looking for a wider market adoption, resulting in significant environmental impacts, including a reduction of 6,113 MT in plastic consumption, 12,116 MT in carbon emissions, and the prevention of 15.3 million litres of water contamination. With the wider market adoption, the organisation is looking to develop and implement a deposit refund system (DRS) for scaling its operations and for matching demand. Scaling operations also means contributing to sustained employment for women, enhancing their economic empowerment and professional development for 3R Solutions.

The company has already planned expansions across Karnataka, Tamil Nadu, and Rajasthan. They are operating with a two million container capacity per month, and hence, they are also aiming to replicate their model in other industries and international markets, including the USA and China.

7. Information, Education & Communication (IEC) Model

3R Solutions drives behavioural change through economic incentives and awareness campaigns. They educate their stakeholders on the benefits of reusable packaging and compliance with upcoming regulations.

8. Programme Monitoring and Evaluation

The organisation's impact is tracked through digital tracking of container lifecycle and reuse and environmental audits to measure reductions in plastic use, emissions, and water contamination.

9. Challenges Encountered and Overcome

The organisation faced challenges in developing effective cleaning solutions and onboarding stakeholders. These challenges were addressed through targeted efforts led by Dr Renu, PhD in Chemistry. More specifically the efforts included developing deinking solutions for brand artwork and transforming manual cleaning process to mechanised one.

Onboarding stakeholders such as companies and waste aggregators has also been challenging for 3R Solutions due to hesitation from companies due to brand concerns and logistical complexities in establishing collection networks. The organisation was able to secure corporate support by demonstrating clear cost savings and regulatory benefits. Further, partnerships with waste aggregators allowed for efficient collection.

10. Other Information

3R Solutions has received a "Greenpreneur of the Year" award from the NITI Aayog supported Women Entrepreneurship Programme. They are also part of the "Innovate 2 Prevent" programme by Yunus Environment Hub and PREVENT Waste Alliance, Germany

11. Website/Application Details

Website	www.3rsolutions.in

7.18

Tetra Pak

Tetra Pak: Supporting Community Empowerment

1. Programme Overview

Tetra Pak, a global leader in food processing and packaging, has developed a robust system to address plastic waste management through the collection and recycling of Used Beverage Cartons (UBCs). This system is primarily driven by empowering waste picker communities, fostering sustainable livelihoods, and promoting education and health within waste picker communities. It exemplifies how cross-sector collaboration and integration can transform waste management into a force for social and environmental progress, setting new standards for industry sustainability.

2. Relevance

India faces significant challenges in managing UBC waste due to limited recycling infrastructure and a waste management sector that is largely informal. Tetra Pak's efforts are aimed at addressing these gaps, promoting responsible recycling, and ensuring that UBCs are collected and processed efficiently. These efforts take the form of multiple responsible recovery, recycling, and behaviour change programmes that work together. The objectives for these initiatives are to contribute to India's sustainability goals and to provide replicable solutions for managing post-consumer waste.

Over the past 20 years, the company has invested INR 75 Crs and partnered with 30+ collection partners, eight recyclers and paper mills, and NGOs to enhance recycling infrastructure, reduce environmental impact, and create livelihood opportunities for waste pickers in India.

3. Detailed Programme Description

Tetra Pak's integrated approach includes education, health, and livelihood enhancement initiatives for waste picker communities. The initiatives involve:

Education: Supporting the waste picker community by operating learning centres under the "Asha Ki Kiran" programme, in partnership with Bal Vikas Dhara (BVD), and providing furniture made of recycled Tetra Pak cartons.

Health: Supporting health clinics and hosting periodic health camps, along with responsible waste collection and recycling practices.

Livelihood: Empowering waste pickers and supporting alternative livelihoods by incentivizing UBC collection and offering alternative employment in tailoring centres.

Image 1: Nobel Laureate Shri Kailash Satyarthi gracing the Bal Vikas Dhara library inauguration as the chief guest

Education

Since 2010, Tetra Pak and NGO Bal Vikas Dhara have empowered India's waste picker communities through the "Asha Ki Kiran" programme. The programme includes operating six non-formal learning centres that have reintegrated 300+ school dropouts with remedial education, nutrition, and early childhood support. The programme has achieved 700+ enrolments of children in government schools and has provided daily nutrition to 300 children.

Tetra Pak and Bal Vikas Dhara have also opened a library at the Asha Ki Kiran Centre in Rangpuri Pahadi, Delhi, with Nobel Laureate Kailash Satyarthi present for its inauguration. The library features furniture made from recycled Tetra Pak cartons. This initiative is part of a 20-year partnership supporting marginalized families and reintegrating school dropouts.

Complementing this initiative, is the “Go Green with Tetra Pak” programme. This programme raises awareness through community drives, workshops, and campaigns regarding UBC recyclability via conversion of cartons into school infrastructure. This programme was launched in 2010 in collaboration with RUR Greenlife, Sahakari Bhandar, and Reliance Smart & Fresh.

Health

In partnership with BVD, Tetra Pak supports health clinics and organizes periodic health camps that provide maternal care, immunizations, health kits, and disease prevention services to over 2,000 members of waste-picker communities. This initiative addresses critical health risks associated with waste management occupations, contributing to improved community well-being.

Image 2: The UBC bin and its use in action

The "Go Green with Tetra Pak" programme also boosts this initiative indirectly by promoting clean and responsible UBC collection and recycling practices. This reduces exposure to unhygienic waste disposal thereby enhancing overall living conditions. Additionally, the "Mera Carton Meri Zimmedari" initiative, launched in 2021 in Bhopal by Tetra Pak and The Kabadiwala further enhances these efforts. It engages residents through over 300 on-ground programmes focused on waste segregation and UBC collection. In 2022, the campaign was expanded to cities such as Indore, Nagpur, Raipur and Lucknow. To make UBC collection convenient, dedicated bins were placed strategically on campuses, and residents could also schedule free pickups through The Kabadiwala app.

Livelihood

Through the partnership with BVD, Tetra Pak empowers over 5,000 waste-pickers by incentivizing UBC collection, boosting incomes through alternative livelihoods, and formalizing roles in waste management. The partnership engages women waste-pickers in Tailoring centres, offering them additional income thereby fostering economic independence.

The initiative further supports waste-pickers by helping them gain access to government schemes. Key achievements of the initiative include providing 2,852 old-age and 305 widow pensions, opening 6,050 PMJDY bank accounts, and accessing 126 Ladli schemes.

The “Go Green with Tetra Pak” initiative extends this impact by creating sustainable livelihoods through community-driven recycling programmes. Key achievements include establishing 230 UBC deposit points, collecting 17 million cartons, donating 800+ school desks and garden benches, and 1,20,000 items made from recycled cartons. These efforts were recognized in the Limca Book of Records in 2013 for being an innovative community model.

The "Mera Carton Meri Zimmedari" initiative complements this by directly engaging residents and waste-pickers in responsible UBC recovery. It also supports over 150 waste pickers in multiple cities, involving them in UBC recovery from dumps and Material Recovery Facilities (MRFs), thus reinforcing their economic stability and formal integration into the waste management ecosystem.

4. Smart Solution

Tetra Pak’s smart solution lies in integrating UBC recycling with community-driven initiatives. The "Mera Carton Meri Zimmedari" campaign introduces strategic bin placements and on-demand pickups via The Kabadiwala app, making recycling accessible and efficient. Additionally, using recycled cartons to create furniture and school infrastructure demonstrates innovation and sustainability.

Image 3: Desks and chairs made from recycled Tetra Pak cartons

5. Website/Application Details

Video: Asha Ki Kiran – A Partnership between Bal Vikas Dhara and Tetra Pak	https://www.youtube.com/watch?v=yP2cM33Qx9c
Video: Go Green with Tetra Pak – Mumbai’s Recycling Revolution	https://www.youtube.com/watch?v=NDK3wwp1eBk
Recycling Tetra Pak Cartons	https://www.tetrapak.com/en-in/sustainability/focus-areas/circularity-and-recycling/our-environment-initiatives/go-green
The Kabadiwala Initiative	https://www.thekabadiwala.com/initiatives/tetra-pak-campaign

19 Reflections

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CEO,
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The compilation of case studies in this publication provides an insightful look into innovative solutions for managing plastic waste in India. These cases showcase a variety of approaches, ranging from community-driven models to technological interventions, all aimed at addressing the pressing issue of plastic pollution. In the cases featured in this compendium the common thread is that of people as change agents. A model built for the people, by the people and of the people – is always a proven recipe for success, providing a roadmap for stakeholders to replicate these practices.

Key Themes and Innovations in Plastic Waste Management

1. Community-Led Initiatives

- Saharanpur Waste Management Model is a standout example of a decentralized, community-driven approach. By engaging Mohalla Committees, especially women, this programme achieved significant results in waste segregation and recycling. The initiative demonstrated the power of participatory planning, with 78,000 households managing wet waste through composting and plastic waste upcycled into school furniture.
- The initiative by the Centre for Environment Education enabled women to generate income by recycling plastics into products, reinforcing the potential of gender-inclusive strategies.
- HCL Samuday in Hardoi, Uttar Pradesh, emphasizes integrating community-based organizations (CBOs) and citizens into waste management processes. By establishing Swachhta Samiti Groups, it encouraged waste segregation, composting, and MRF operations. The programme also set up a functional Material Recovery Facility (MRF) and achieved 74% waste segregation at the household level within a year, demonstrating the effectiveness of grassroots mobilization.
- GIZ's Sustainable Plastic Waste Management focused on Trivandrum, Kerala, this initiative brought together self-help groups (SHGs) and local authorities to streamline waste segregation and plastic waste management. By integrating technical training and digital solutions for SHGs, the programme created a replicable model for efficient plastic waste handling while fostering community ownership.

2. Technological Interventions

- The Swachhata Mitra Application (SMA) developed by ITC for the Ganga Gram programme, is a digital tool facilitating real-time tracking of waste management activities across 261 Gram Panchayats, significantly improving operational efficiency.
- ClimaOne Platform, a clean-tech platform that ensures transparency and traceability in waste streams, offers scalable solutions for extended producer responsibility (EPR) compliance.

- The Trashify Web Application, a data-driven tool provides detailed insights into waste facilities, helping streamline operations and improve efficiency. By leveraging technology, Trashify address an important issue of waste segregation
- Saahas Zero Waste are one of the early adopters of IoT technology in waste management. The IoT technology can help create traceable waste management systems ensuring maximum resource recovery and minimizing waste sent to landfills, with measurable reductions in CO2 emissions.

3. Circular Economy Approaches

- FINILOOP focused on integrating informal waste workers into the value chain, this initiative supported the creation of start-ups and strengthened the plastic waste ecosystem. It is a prime example of leveraging economic incentives for sustainability.
- Recycling and End-of-Life Management was well demonstrated by the Tambaram municipal corporation's effort to handle low-value plastics showcasing the importance of integrating EPR with financial incentives like plastic credits.
- Udupi Zilla Panchayat one of Karnataka's first rural Material Recovery Facility (MRF) gives us a wonderful example for rural circular solutions.
- An interesting intervention by Code Effort Pvt. Ltd. the organization that pioneered cigarette butt recycling, collecting and recycling gives us solutions to recycle an often-overlooked pollutant.
- Another often neglected component of solid waste is menstrual waste in the form of sanitary pads that often contain both Volatile Organic Compounds (VOCs) and phthalates. Due to the presence of these, improper waste management of disposed sanitary waste can have adverse health implications. PadCare Labs' innovative menstrual waste management solution recycles used sanitary pads, recovering plastic and reducing CO2 emissions.

4. Behavioural Change and Awareness

- Targeting community-level behavioural change, the RACE Campaign promoted circular economy principles and recycling behaviours, illustrating the critical role of awareness in driving sustainability.
- Grant Thornton and Akshar Foundation's Swachh School Campaign initiative integrates waste management and behavioural change into school curricula, training young Swachhata ambassadors to drive sustainable practices within communities.

Recommendations and Key Takeaways

By providing real-world case studies and evidence-based recommendations, this edition compendium of best practices in PWM, facilitates informed decision-making for policymakers, practitioners, and businesses. There are several take aways to be derived from the cases featured in this year's edition:

1. **Invest in building Social Capital**

   Programmes like the Samuday Initiative, CEE's Bartan Bank initiative and the role played by ITC's Mohalla Committees once again underscore the importance of community mobilization. Initiatives that can build social capital by empowering our communities and mobilizing at the grassroots level are far more likely to achieve sustainability than a top down approach.

2. **Focus on Operations and Maintenance**

   Phase 2 of the Swachh Bharat Mission focused greatly on building the circular economy infrastructure such as Material Recovery Facilities and Waste treatment plants. However, without accounting for long term operations and maintenance the best of infrastructure can fall into disarray and disuse. One of the ways to ensure sustained O&M is by making PWM initiatives financially viable. Initiatives like Digital Kabadiwala and user fee models in the Ganga Gram programme have demonstrated the potential of community contributions and resource recovery for funding. Programmes can further integrate EPR frameworks and plastic credits, as seen in Tambaram.

3. **Empower Informal Sector Workers**

   The integration of informal waste workers into formal systems is crucial not only for the programme but also India's social development. Informal waste workers are the backbone of the recycling economy, but unfortunately, they often have to endure harsh working conditions, low incomes, and social stigma despite their vital role in waste management. With minimal access to protective gear, healthcare, or financial security, these workers face significant health risks while striving to earn a living. Empowering this workforce through formal inclusion, training, and welfare initiatives is essential to creating an equitable and sustainable waste management system. Programmes like FINILOOP and Tetra Pak's initiatives provide us with a wonderful roadmap for inclusion of these waste workers into the formal waste value chain.

4. **Foster Behavioural Change**

   In 2019, the Swachh Bharat Mission rural and urban set an example by leading the world's largest successful behaviour change initiative. People from all walks of life joined hands to eradicate the age-old practice of open defecation. Today the world is recognizing the impact that the SBM programme had on our health and wellbeing. We need similar persistent efforts to build habits and change mindsets around waste segregation and recycling. Until the community agrees to the motto of 'Reduce, Reuse and Recycle', plastic consumption and consequently plastic waste generated is not likely to recede. Campaigns like the RACE Campaign and Swachh School Swachh Shehar Campaign highlight the importance of education and engagement, especially among youth. Tailored, community-driven IEC strategies, such as Mohalla Committees and "Learning by Doing" models, have proven highly effective.

5. **Adopt and Scale Technology Solutions**

   Technology is our best friend when it comes to tackling the challenges of plastic waste, which in itself was a technological miracle of the 20th century. Digital tools like Swachhata Mitra Application and ClimaOne can significantly enhance efficiency in tracking, monitoring, and decision-making. Expanding the use of IoT, as seen with Saahas Zero Waste, can improve transparency and resource recovery in waste streams.

6. **Encourage Circular Economy Practices**

   Circularity is a mindset. Programmes like FINILOOP, Code Effort, and PadCare Labs demonstrate the value of reintegrating waste into the production cycle, reducing dependency on virgin materials, and promoting innovative recycling methods. Scaling these practices can create economic and environmental benefits.

7. **Strengthen Policy and Regulation**

   While India already has robust policies and regulatory frameworks, we need further enforcement and scalability of the initiatives to hold producers accountable.

8. **Measure for impact and course correction**

   Regular monitoring and measurable outcomes can guide improvements and course corrections in order for India to reach her sustainable development goals with regards to circularity. For instance, Saahas Zero Waste documented reductions of 94,817 MTs CO_2 equivalent, while Saharanpur's model improved dry waste recovery from 61 MTs to 127 MTs annually. Publicizing these achievements can also motivate replication and inspire broader participation.

A detailed reading of the cases will make it clear that there is no one size fits all model, and the best solutions are ones that are grounded in local context such as geography, social capital, availability and access to resources, and the rate of innovative and technological adoptions among the community. However, there is a lot to reflect on and learn from some of the amazing stories of innovation, social transformation, and the sheer dedication to ensuring that we leave behind a better planet for our children. I, therefore, encourage all policy makers, practitioners, academicians and researchers, the private sector, and implementation agencies and NGOs to make full use of the learnings of this Compendium.

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