



GAIL (India) Limited

**Impact Assessment Report on Support
under Swachh Bharat Missions for
Providing Mechanical Garbage collecting
machine to BBMP, Bangalore (FY 19-20)**



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1.1 Executive Summary

Over the last few decades, India has expedited its journey to being a worldwide leader in both thought and action. Being the second most populous country in the world and on way to become the most populous country in the near future by overtaking China, India has the ability to offer the pivotal traction required to achieve the 2030 Sustainable Development Goals (SDGs). India's alignment with the international development agenda, as exemplified by the motto "*Sabka Saath Sabka Vikas*" (*collective efforts, inclusive growth*), underlines the country's commitment to the SDGs.

With over 1.4 billion people from diverse social, economic and cultural backgrounds, India faces an arduous challenge in meeting their aspirations. Nonetheless, the story of India since 1947 reflects an impressive growth. The country has effectively lifted more than 271 million people out of multidimensional poverty through economic growth and empowerment.¹ Inequalities in housing, nutrition, child health, education, sanitation, drinking water, and electricity have decreased as a result of enhanced access and reduction in poverty. Nonetheless, on the national level, there is still a substantial amount of work to be done in multiple sectors. In order to realize its immense economic potential and strive toward inclusive development, India must accelerate and maintain its upward trend on key social development metrics.

With the increasing population, growing inter-state migration, and rapid urbanization, Solid Waste Management (SWM) remains a persistent challenge in urban India. In a country like India, a number of factors, including the local government policy, the country's legal framework, financial resources, and social and cultural perspectives, all play a key part in maintaining an effective waste management system.² As per the 12th Schedule of the 74th Constitution Amendment Act of 1992, Urban Local Bodies (ULBs) are responsible for waste management. However, most of the ULBs lack the infrastructural, financial, and institutional capacity to effectively tackle the waste generated³.

With an over-arching objective of building a *Swachh & Swastha Bharat*, the Government of India launched Swachh Bharat Abhiyan in 2014 to improve the overall performance of community hygiene indicators. The objective was to increase public awareness about good WASH practices and to enhance the nation's infrastructure in terms of sustainable sanitation, hygiene, and waste management systems. Inadequate waste disposal frequently has the biggest impact in metropolitan areas given the sheer population of these areas.⁴ Therefore, the Swachh Bharat Mission laid special emphasis on strengthening urban waste management practices.

Looking at the mission through a state lens, the literature suggests that Karnataka hasn't fared well in its implementation. In the Swachh Survekshan Survey of 2022, Karnataka was ranked 20th among all states in terms of cleanliness⁵. Bengaluru was placed 43rd

¹ Sashakt Bharat- Sabal Bharat (Empowered and Resilient India)- Voluntary National Review :2020

² Priti, Mandal, K. (2019 June 03) *Review on evolution of municipal solid waste management in India: practices, challenges, and policy implications*. Journal of Material Cycles and Waste Management. Vol 21, 1263–1279

³ Satpal Singh, "Solid Waste Management in Urban India: Imperatives for Improvement," ORF Occasional Paper No. 283, November 2020, Observer Research Foundation.

⁴ Singh S. Kunwar N & Sharma A. (2018) *Impact of Swachh Bharat Abhiyan in Indian society*. International Journal of Home Science 2018; 4(1): 215-219

⁵ <https://www.deccanherald.com/national/karnataka-secures-20th-rank-while-telangana-bags-first-place-in-swachh-survekshan-survey-1150330.html>

among the cities in the '> 10 lakhs population' category in the survey⁶. This implies that the city has fundamental shortcomings in waste-collecting infrastructure and practices. One of the main objectives of SBM is the collection of waste that has been segregated at the source, yet it seems that the city lacks the infrastructure to achieve this.

Being a socially conscious public sector organization, GAIL (India) Limited attempted to tackle the aforementioned issue. Under its *Swachhata* theme and in accordance with the thematic areas mentioned in Schedule VII of the Companies Act (2013), GAIL has supported the municipal corporation of Bengaluru by providing mechanical dry waste collection vehicles for improving the waste collection and waste segregation scenario in the city.

By providing Swachhata equipment to Bruhat Bengaluru Mahanagara Palike (BBMP), the CSR intervention was designed to assist BBMP in the smooth implementation of the Swachh Bharat Mission (SBM). GAIL provided 18 four-wheeler CNG (Dual Fuel) dry waste collection vehicles to BBMP, thus widening the reach of the initiative and helping improve the general waste collection scenario. Furthermore, the goal of providing CNG vehicles was to help reduce air pollution in the city.

Due to the increased availability of waste collection vehicles, the interviewed stakeholder recognized that the initiative aided in ensuring door-to-door waste collection. Further, it emerged that the project was essential in promoting waste segregation at the source among the community.

GAIL (India) Limited empaneled KPMG to carry out an impact assessment study of the intervention so as to assess the project's impact and comprehend the perception of the stakeholders. To understand the goal and scope of the project, stakeholder consultations and a review of the team's documents and data were conducted. Following a desk review, the programme team helped identify and finalize key performance indicators. The OECD-DAC (Organisation for Economic Co-operation and Development- Development Assistance Committee) framework was utilised for developing research tools (questionnaires for qualitative surveys) and evaluating the impact created for this study.

⁶ <https://ss2022.sbmurban.org/#/scorecard>

1.2 Introduction

1.2.1 CSR at GAIL

GAIL (India) Limited, conferred with the status of *Maharatna* in 2013, is India's leading natural gas company with diversified presence across the natural gas value chain of trading, transmission, LPG production, LNG regasification, petrochemicals, city gas, etc. It owns and operates a network of around 14617 km of natural gas pipelines spread across the length and breadth of country. GAIL firmly believes that meeting people's needs, enhancing communities, and safeguarding the environment will ultimately determine how long progress can be sustained.

Pursuant to the provisions of the Companies Act, 2013 and rules made thereunder including the statutory modifications/ amendments from time to time as notified by the Government of India, GAIL (India) Limited earmarks two percent of its average net profit of the preceding three financial years towards achieving its CSR objectives through implementation of meaningful and sustainable CSR programmes.

1.2.2 GAIL CSR Vision

GAIL, through its CSR initiatives, will continue to enhance value creation in the society and in the community in which it operates, through its services, conduct & initiatives, so as to promote sustained growth for the society and community, in fulfillment its role as a Socially Responsible Corporate, with environmental concern.

1.2.3 GAIL CSR Objectives

- Ensure an increased commitment at all levels in the organization, to operate its business in an economically, socially & environmentally sustainable manner, while recognizing the interests of all its stakeholders.
- To directly or indirectly take up programmes that benefit the communities in & around its work centres and results, over a period of time, in enhancing the quality of life & economic well-being of the local populace.
- To generate, through its CSR initiatives, goodwill, and pride for GAIL among stakeholders and help reinforce a positive & socially responsible image of GAIL as a corporate entity.

1.2.4 About the project/programme

People's consuming habits have altered dramatically as an outcome of the industrial revolution and economic progress.⁷ With the ever-increasing consumption and production, waste management is a pivotal administrative issue in India, especially in the urban areas. The rate at which urbanization is expanding is unprecedented. Small to

⁷ Gour A. Singh S. (2022 October 27) *Solid Waste Management in India: A State-of-the-Art Review*. Environmental Engineering Research 2023. Vol 28(4).

medium-sized cities in low-income countries account for the majority of such urbanization.⁸ With rising urbanization, the burden of waste generation and the proportion of inorganic waste therein has been parallelly increasing, adversely affecting waste management and making it a contemporary global issue.⁹

The generation of solid waste is a natural byproduct of human activity, and how it is treated has a substantial effect on the health of the local community and environment.¹⁰ Globally, as plastic and electronic consumer products proliferate, people are disposing of increasing amounts of waste, and its structure is more complex than ever before.¹¹ This emphasizes the need for sustainable disposal and management of waste. The characteristics of local waste vary with cultural, meteorological, and socioeconomic aspects, as well as institutional capabilities. This reason explains why waste governance is becoming more regionalized and institutionalized on a global scale. Therefore, it is only natural that the onus of providing excellent waste management services has frequently fallen on cities¹².

The challenge of effective waste management in urban areas has been somewhat adequately tackled in a few industrialized nations, such as Germany, Sweden, and Canada. However, the majority of developing and poor countries, are still developing their fundamental infrastructure, and still have a long way to go toward sustainable waste management.¹³

In the context of India, the proliferation of urban areas, shifting consumer habits, and industrialization has led to a rise in municipal waste generation.¹⁴ With the increasing population and rapid urbanization, Solid Waste Management (SWM) remains a persistent challenge in India, especially in urban areas. As per the 12th Schedule of the 74th Constitution Amendment Act of 1992, Urban Local Bodies (ULBs) are responsible for waste management. However, most of the ULBs lack the infrastructural, financial, and institutional capacity to effectively tackle the waste being generated¹⁵.

A need to cultivate community awareness and change the attitude of people in India towards waste has been established in literature, as fundamental to developing proper and sustainable waste management systems. This is because of a general lack of responsibility towards waste in the community¹⁶. To address this necessity in the variegated landscape of the country, the Swachh Bharat Abhiyan was introduced in 2014. The initiative aimed to raise awareness and improve infrastructure to support the development of sustainable sanitation, hygiene, and waste management systems in the nation. The campaign sought to engage the community in home, workplace, village, and

⁸ Cohen B. (2004) *Urban growth in developing countries: a review of current trends and a caution regarding existing forecasts*. World Dev. 32(1):23–51

⁹ Gour A. Singh S. (2022 October 27) *Solid Waste Management in India: A State-of-the-Art Review*. Environmental Engineering Research 2023. Vol 28(4).

¹⁰ Vergara S. & Tchobanoglous G. (2012) *Municipal Solid Waste and the Environment: A Global Perspective*. Annual Review of Environment and Resources. Vol. 37:277–309

¹¹ Ibid.

¹² Ibid.

¹³ Bhattacharya S. Chatterjee S. & Sachdev B. (2021 November) *An Examine on the Solid Waste Management System in Urban India and Its Impact on Climate Change*. International Journal of Innovative Research in Science, Engineering and Technology. Vol. 10, Issue 11.

¹⁴ Priti, Mandal, K. (2019 June 03) *Review on evolution of municipal solid waste management in India: practices, challenges, and policy implications*. Journal of Material Cycles and Waste Management. Vol 21, 1263–1279.

¹⁵ Satpal Singh, "Solid Waste Management in Urban India: Imperatives for Improvement," ORF Occasional Paper No. 283, November 2020, Observer Research Foundation.

¹⁶ Kumar, Sunil, et al. "Challenges and opportunities associated with waste management in India." Royal Society open science 4.3 (2017): 160764.

city cleanliness, which would result in a significant decrease in waste and pollution. The effort placed a strong emphasis on the creation of effective waste disposal and sanitary systems¹⁷. It was duly recognized in the programme that in order to achieve the desired results, the states themselves were best positioned to choose the type of approach, technique, and technology that best meets their socioeconomic, geographic, cultural, linguistic, and technological settings¹⁸.

When it comes to the state of Karnataka, the state hasn't fared well in the implementation of the Swachh Bharat Mission. In the Swachh Survekshan Survey of 2022, Karnataka was ranked 20th among all states in terms of cleanliness¹⁹. Only two of its cities were positioned among the top 100 clean cities in the country in the survey²⁰.

Megacities in India are a relatively recent phenomenon, driven by globalization of the economy, culture and technology. These megacities have a higher waste generation per capita – for example, the average solid waste generation per capita for Bengaluru is 0.4-0.6 kg per capita²¹. Bengaluru was placed 43rd among the cities in the '> 10 lakhs population' category in the Swachh Survekshan Survey of 2022²². Further, BBMP failed to meet the criteria for Garbage Free Cities and Water Plus (treatment of sewage and re-use of wastewater)²³.

Being a major IT hub of the country with over 42% of the city's population being immigrants²⁴, Bengaluru's per-day waste generation has been steadily proliferating. In fact, Bengaluru was routinely referred to as "Garbage City"²⁵ and the local body was continually under scanner for mismanagement of the city's garbage disposal system before the implementation of Swachh Bharat Mission.

The current policy discourse attempts to shift the city away from using landfills as the primary waste disposal option to source reduction and decentralized waste management²⁶. BBMP has made it mandatory for all people to segregate garbage at source since 2017 and many gated communities and apartments have put decentralized waste processing facilities in place²⁷. However, the city lacks adequate infrastructure for the collection of dry waste that has been segregated at the source, which is one of the primary goals of SBM and a mandate under Solid Waste Management rules, 2016.

In order to tackle this challenge, GAIL, under the *Swachhata* theme of its CSR interventions, provided the city administration with 18 dry waste collection vehicles.

¹⁷ Singh S. Kunwar N & Sharma A. (2018) *Impact of Swachh Bharat Abhiyan in Indian society*. International Journal of Home Science 2018; 4(1): 215-219

¹⁸ Jangra B. Majra J. & Singh M. (2017 July 03) *Swachh Bharat Abhiyan (Clean India Mission): SWOT Analysis*. International Journal of Community Medicine and Public Health. Vol 12, 3285-3290.

¹⁹ <https://www.deccanherald.com/national/karnataka-secures-20th-rank-while-telangana-bags-first-place-in-swachh-survekshan-survey-1150330.html>

²⁰ <https://www.deccanherald.com/state/top-karnataka-stories/mysuru-8th-cleanest-city-karnataka-s-poor-show-in-the-swachh-survekshan-cleanliness-survey-1150119.html>

²¹ <https://site.bbmp.gov.in/swmnew.html>

²² <https://ss2022.sbmurban.org/#scorecard>

²³ <https://www.thehindu.com/news/national/karnataka/bengaluru-secures-43rd-position-in-swachh-survekshan-ranking/article65960299.ece>

²⁴ <https://www.thehindu.com/news/cities/bangalore/migrants-constitute-42-of-bengalurus-population/article28734588.ece>

²⁵ <https://www.hindustantimes.com/india-news/bengaluru-how-india-s-garden-city-became-garbage-city/story-wkY96bgDnWx6gCWphczRMM.html>

²⁶ <https://www.thehindu.com/news/cities/chennai/in-bangalore-crisis-in-waste-management-forces-change/article5016622.ece>

²⁷ <https://www.thehindu.com/news/cities/chennai/in-bangalore-crisis-in-waste-management-forces-change/article5016622.ece>

These collection vehicles were CNG four-wheeler autos with an inbuilt dual fuel system that ensured operability with CNG as well as petrol. The interoperability factor was important given the limited number of CNG filling stations in the city.

The vehicles were customized as per BBMP specifications and the decision of providing CNG vehicles was made after a thorough comparative analysis of vehicles of different fuel types. Because of its relatively lower carbon content, CNG burns cleaner than petroleum-based fuels. It emits the fewest emissions of any other fuel and has far fewer contaminants than gasoline. CNG emits 20-30% less greenhouse gas and 95% less exhaust emissions than petroleum fuels²⁸.

Further, GAIL duly registered the vehicles in the name of BBMP and bought insurance coverage for them before the timely handover to BBMP for operation.

1.2.5 About the Implementing Agency

The Bruhat Bengaluru Mahanagar Palike (BBMP) is the administrative body of Bengaluru city, in charge of providing civic facilities and some of the area's infrastructure. It is India's fourth-largest municipal corporation, and is in charge of roads and infrastructure, drainage, waste management, public open spaces, trade, and education, among other subjects. BBMP is divided into eight zones and 198 wards for administrative convenience and is administered by a city council composed of elected representatives. BBMP caters to an area of 709 sq km inhabited by over 1.3 crore people.²⁹ BBMP is responsible for collection, street sweeping, transportation, processing, and disposal of Municipal Solid Waste from generators.

1.3 Methodology and Approach

GAIL has been implementing successful CSR initiatives based on community needs. A third-party evaluation of the results attained is essential given the dynamic nature of the social development programmes deployed. This impact assessment aims to dissect what has been done well and what more can be done moving forward. It will not only assist in determining the significance of the project, including the efficiency of project design and interventions, sustainability of results, and impact of the intervention on the target community, but it will also provide guidance for expanding or replicating the successful initiatives while redesigning or ending the projects/initiatives that were unable to have the intended impact.

The impact assessment is intended to provide key insights on the following questions:

²⁸ <https://economictimes.indiatimes.com/gail-article/can-natural-gas-help-lower-pollution-levels/articleshow/54777201.cms>

²⁹ <https://site.bbmp.gov.in/swmnew.html>

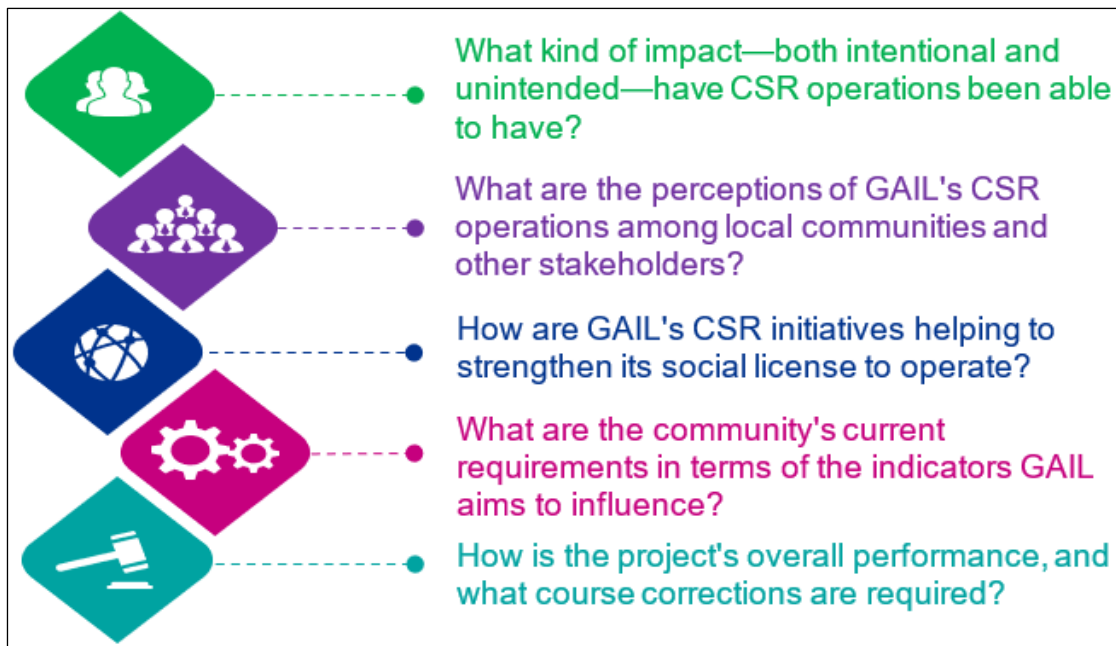


Figure 1: Research questions

The study was conducted through a combination of qualitative and quantitative data collection techniques. These include in-depth interviews and Focus Group Discussions with beneficiaries and key stakeholders, as well as secondary research in the multiple thematic areas for a baseline perspective.

1.3.1 The OECD-DAC Evaluation Framework

Given the fundamental approach for conducting an impact study, the OECD-DAC (Development Assistance Committee) Evaluation Network's framework is well regarded for assessing the efficacy of development programmes. In response to the need for a method through which development agencies could monitor the financing supplied to multilateral organisations for various development initiatives, the DAC Evaluation Network developed a set of evaluation criteria for measuring the performance of any development project (UNICEF, 2012).

In 1991, the OECD Development Assistance Committee (DAC) devised the criteria for assessing international development cooperation. They are now widely used beyond the DAC and have established themselves as a cornerstone of evaluation methodology. These standards have routinely been used for international donors, including UN agencies (OECD, 2020).

The OECD DAC Network has identified six evaluation criteria and two principles for their application: relevance, coherence, effectiveness, efficiency, impact, and sustainability. These criteria are meant to help facilitate evaluations. They were revised in 2019 to improve the accuracy and utility of assessment and to strengthen evaluation's contribution to sustainable development (OECD, 2020).

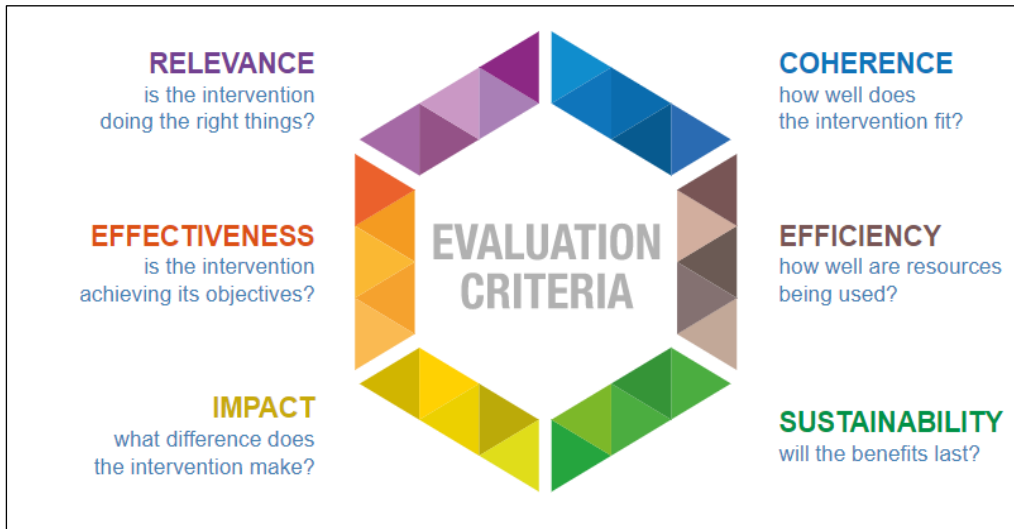


Figure 2: OECD-DAC Evaluation Criteria

1.3.2 Geographical Scope

The impact assessment for this project covered 1 state and 1 district.

	State	District
Under GAIL CSR's initiative	Karnataka	Bengaluru

Table 1: Geographical Scope

1.3.3 Data Collection and Analysis

In Bengaluru, KPMG carried out the data collection exercise virtually with assistance from GAIL CSR SPOCS. In-depth interviews were conducted with the relevant stakeholder, with the help of pre-designed questionnaires, through telephonic means and Microsoft Teams for data collection. The data was later updated and translated into excel sheets. Following data collection and cleaning, the data was analysed, and outcomes were utilised to assess the project's impact.

1.3.4 Stakeholder Map

Stakeholders play an imperative role in project implementation on the ground. Stakeholder involvement can offer insightful information that aids in making critical decisions for the organisation. They can aid in designing improved guidelines, processes, and systems, as well as future communications and plans. Institutions and stakeholders taking part in the exercise include:

Project	Type of Stakeholder	Number of stakeholders
Support under Swachh Bharat Missions for Providing Mechanical Garbage collecting machine to BBMP, Bangalore (FY 19-20)	GAIL CSR Project SPoC	1
<p><i>*Stakeholder interaction was conducted virtually. Interaction with BBMP personnel could not be conducted due to their lack of availability. Due to inability to connect to BBMP personnel and the nature of study being virtual, beneficiaries could not be reached out to for this project</i></p>		

Table 2: Stakeholders involved in the sampling

1.3.5 Impact Map

Thematic Area	Location	Project Name	Implementing Agency	Overall Objective	Key Activities	Key Outputs	Key Outcomes	Impact
Sanitation & Environment, [Point (i) (iv), Schedule VII, Companies Act 2013]	Bangalore, Karnataka	Support under Swachh Bharat Missions for Providing Mechanical Garbage collecting machine to BBMP, Bangalore (FY 19-20)	Bruhat Bengaluru Mahanagar Palike (BBMP)	To assist in the implementation of the <i>Swachh Bharat Mission</i> in Bengaluru, thereby improving the city's cleanliness and making it pollution-free.	Provision of mechanical garbage collection vehicles.	Provision of 18 mechanical dry waste collection vehicles	<ul style="list-style-type: none"> Increased access to waste disposal machines Improved household level waste collection Increased access to energy-efficient vehicles 	Improvement in waste management Reduction in air pollution

Table 3: Impact Map of the project

1.4 Scoring Matrix

A scoring guideline was designed where OECD DAC parameters were scored and bundled basis our understanding of GAIL project and availability of information. Weights were assigned to the bundled OECD DAC parameters. Also, a parameter on Branding was included to understand the community's awareness on the project. Various components within the parameters have been assigned scores. Weights and scores have been used to compute the overall score for the location.

The following scoring matrix was developed to rate the performance of the project:

OECD Parameters	Indicators	Weightage	Combined Weightage
Relevance	Needs Assessment Report	20%	W1: 40%
	Relevance to target beneficiaries	50%	
	Alignment to SDGs	30%	
Coherence	Alignment with national policy	50%	
	Alignment with GAIL CSR policy	50%	
Efficiency	Timeline Adherence: Project Completion	40%	W2: 40%
	Duplication	20%	
	Adherence: Budget	40%	
Effectiveness	Identification of problem	25%	
	Process driven implementation strategy	25%	
	Qualified implementation team	25%	
	Targeted beneficiaries	25%	
Impact	Vehicles provided by GAIL being used effectively	25%	
	Vehicles provided by GAIL fuel efficient	25%	
	Vehicles provided by GAIL have helped to increase door to door waste collection	25%	
	Vehicles provided by GAIL have given employment to people	25%	
Branding	Visibility (visible/word of mouth)	100%	W3: 10%
Sustainability	Sustainability Mechanism, Convergence	100%	W4: 10%
Score= W1* Average (Relevance, Coherence) + W2*Average (Efficiency, Effectiveness, Impact) + W3* (Branding) + W4* (Sustainability)			

Table 4: Scoring Matrix

1.5 Impact Assessment

1.5.1 Relevance of Intervention

Relevance is a measure of how much the intervention objectives and design respond to the needs, beliefs, and priorities of the beneficiaries and continue to do so even if circumstances change.

Relevance measures how effectively a programme is aligned with the goals and policies of the Government in which it is implemented. It also aims to know if the programme is relevant to the needs of the beneficiaries. The program's relevance is understood in this context in terms of community needs as well as linkages to existing Government operations.

As per the Annual Report on Implementation of Solid Waste Management Rules, 2016 (2020-21), the total quantity of solid waste generated in the country was 160038.9 TPD and overall, a collection intensity of 95.4% was achieved. Half of the total solid waste collected was treated, 18.4% was landfilled and the remaining 31.7% remained unaccounted for. Table 4 showcases the overall solid waste management status for Karnataka³⁰

Solid Waste Generated (TPD)	Collected (TPD)	Segregated and Transported (TPD)	Treated (TPD)
11,085	10,198	8,646	6,817

Table 5: Solid Waste Management in Karnataka

As has been established in the preceding section, Karnataka hasn't been performing well in the implementation of Swachh Bharat Mission. Further, the state capital, Bengaluru faces challenges related to the fundamental infrastructure and processes of segregated waste collection in a number of its wards.

The transportation of solid waste is yet another major impediment. According to Table 4, 77 % of the total amount of solid waste generated was segregated and transported. The vehicles typically used for primary collection are pushcarts or tricycles with containers or bins, and so on, which are not adequately equipped to collect segregated waste³¹. Moreover, the vehicles used for the collection are mostly diesel or petrol run.

The project focused on aiding the implementation of Swachh Bharat Abhiyan by providing waste collection vehicles to BBMP. The interviewed stakeholder deemed this project as relevant as it enabled the expansion of coverage of door-to-door waste collection services. The interviewed stakeholder agreed that there was a need for these vehicles. They also highlighted that the project has played a significant role in promoting waste segregation at source among the communities in the target wards.

³⁰ Annual Report 2020-21 on Implementation of Solid Waste Management Rules, 2016.

https://cpcb.nic.in/uploads/MSW/MSW_AnnualReport_2020-21.pdf

³¹ Satpal Singh, "Solid Waste Management in Urban India: Imperatives for Improvement," ORF Occasional Paper No. 283, November 2020, Observer Research Foundation.

1.5.2 Coherence of Intervention

Coherence refers to the compatibility of the intervention with other interventions in a country, sector, or institution.

It measures the extent to which other interventions (particularly policies) support or undermine the intervention and vice versa.

I. Alignment of the programme with National Priorities and Sustainable Development Goals (SDGs)

The Sustainable Development Goals (SDGs), commonly recognized as the global goals, were established in 2015 by all United Nations members with the purpose of eradicating poverty, protecting the environment, and ensuring that everyone lives in peace and prosperity by 2030. India was a significant contributor to the development of the SDGs and is committed to achieving them by 2030.



SDG Goal	Target	Sub-targets ³²	How is it aligned?
GOAL 3	Good Health and Well-Being	3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination	The project's aim was to improve the practice of door-to-door waste collection and to concomitantly reduce waste disposal in public locations. This would result in an improvement in the districts' overall health and well-being and a reduction in soil, water and air pollution which would in turn have a positive impact on the health of community members. Moreover, CNG is a relatively cleaner fuel as compared to petrol or diesel and therefore adds to the pollution-reducing nature of the project.
GOAL 6	Clean Water and Sanitation	6.b Support and strengthen the participation of local communities in improving water and sanitation management	The project aimed to improve waste collection by enabling segregation of wet and dry waste at the household level.
GOAL 8	Decent Work and Economic Growth	8.3 Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity,	The project aimed at increasing employment opportunities for people in the target areas as drivers and

³² <https://sustainabledevelopment.un.org/topics/sustainabledevelopmentgoals>

		<i>and innovation, and encourage the formalisation and growth of micro-, small- and medium-sized enterprises, including through access to financial services</i>	ancillary workers for the waste collection vehicles.
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Table 6: SDG Mapping

II. Coherence with national priorities:

The project is further aligned with the national and state government goals, policies, and initiatives, as listed below:

Initiative	Description	Coherence
Swachh Bharat Abhiyan	The Swachh Bharat Abhiyan was launched in 2014 to address the country's substantial WASH sector components that require attention for improvement. The objectives of the initiative were to increase public awareness and enhance the nation's infrastructure in order to assist the growth of sustainable sanitation, hygiene, and waste management systems. One of the key goals of the programme was to make the country Open Defecation Free through the construction of toilets.	In line with the vision and objectives of the scheme, the project activities aim at contributing towards provision of dry waste collection vehicles to the ULB of Bengaluru city to aid their waste management initiative.
Solid Waste Management Rules, 2016	It provides for waste generators to segregate waste at source and allocate dry waste for recycling and reuse, as well as utilize wet waste from the kitchen for composting or biomethanation. The local authorities are responsible for setting up "the material recovery facilities or secondary storage facilities.	In line with the rules, GAIL added to the capacity of the local authority to collect segregated dry waste to wards.

Table 7: Alignment with national priorities

1.5.3 Effectiveness of Intervention

Effectiveness is defined as an assessment of the factors influencing progress toward outcomes for each stakeholder as well as validation of the robustness of systems and processes.

It aids in ensuring that the implementation and monitoring processes are sturdy in order to achieve the greatest possible social impact. The efficacy of the programme is established by examining how well the program's activities were carried out as well as the efficiency with which the program's systems and processes were implemented.

The project's goal was to improve the process of waste collection in the target wards and aid the implementation of Swachh Bharat Abhiyan. Therefore, to successfully attain these outcomes, the project adopted the following measures:

- I. **Identification of the problem:** The project's main objective was to solve the issue of shortage of waste collection vehicles in the city. To be able to deliver the best results for the communities and stakeholders involved, the issue was identified, and the project was effectively developed by keeping in mind the need of the hour. Before reaching a decision, a meticulous comparative analysis was performed to determine which option was more cost-effective and ecofriendly among petrol, diesel, and CNG-powered vehicles.
- II. **Robust implementation strategy:** The project employed a process-driven implementation strategy that included fundamental market research to ensure a context-specific initiative, standardised activities with a set timeframe to assure quality, and pre-determined KPIs to ensure consistency.
- III. **Diligent implementing team:** The GAIL CSR team effectively oversaw the entire process end-to-end, starting from liaising with BBMP officials, procurement and delivery of customized vehicles, their registration and insurance process to finally handing it over to BBMP. This contributed to the preservation of implementation quality and provided prompt assistance to the municipal corporation, whenever required.

1.5.4 Efficiency of Intervention

The efficiency criterion seeks to determine whether the project was completed in a cost-effective and timely way.

The purpose is to establish whether the inputs (funds, knowledge, and time) were effectively employed to create desired intervention outcomes. This evaluation criterion attempts to determine whether the programme was completed on schedule and within budget. The project has been efficiently implemented in the target wards with the support of key stakeholders.

- I. ***Timeliness of delivery or implementation of project interventions***
The programme was implemented within the estimated time period by BBMP with support from GAIL CSR team.
- II. ***Cost efficiency of project activities***
Interaction with the GAIL CSR team members also revealed that there was no budget overflow and that all the activities were successfully carried out within the allotted budget. Payment milestones were clearly defined as such, and interventions were implemented in the districts in consultation with the key stakeholders.
- III. ***Duplication/ overlap of project activities***
Duplication of effort arises when similar interventions are needlessly undertaken within the same community/ location due to poor knowledge management and inadequate coordination of projects, thereby resulting in fund and resource inefficiency. In this case, it was discovered that BBMP was in requirement of more waste collection vehicles to collect segregated waste from a few of its wards. As a result, this project contributed to expanding the



coverage of segregated waste collection to more wards and therefore, was not a duplication.

1.5.5 Visibility of GAIL/Branding

The vehicles provided to BBMP had the GAIL logo visible on them and proper GAIL branding had been undertaken to spread awareness that the project had been supported by GAIL

1.5.6 Impact of Intervention

Impact has been measured in terms of the proportion of respondents who reported having a significant change in their lives due to the initiation of the project.

The goal of measuring the impact is to determine the project's primary or secondary long-term impacts. This could be direct or indirect, intentional, or unintentional. The unintended consequences of an intervention can be favorable or harmful.

I. Short-Term Impacts

a. Improvement in the waste collection and segregation process

The primary vehicles for waste collection in Bengaluru city are auto tippers and pushcarts. An auto tipper is provided for every 1,000 households and a pushcart for every 200 households³³. While BBMP currently possesses 4,646 auto tippers for its 198 wards, it is still in need of 565 more such vehicles to effectively cover all wards and accomplish cent percent house-to-house segregated waste collection³⁴.

Based on the type of waste and the best approaches for treatment and disposal, waste should ideally be segregated. If household waste is not adequately segregated, it will possibly end up intermixed in landfills just as it was in household bins. Food scraps, paper, and liquid waste can combine and decay, releasing toxic gas into the atmosphere and runoff into the soil.³⁵ Moreover, currently, only 30% of the waste generated in the city is segregated at source despite the mandate of compulsory source segregation by BBMP. This suggests that the waste collected by primary collection vehicles is usually in an unsegregated form. The waste collected from residences is taken to a common point from where the waste is transferred to treatment sites through compactors and tipper vehicles.

Addressing the issue of non-segregation at source, separate collection vehicles were introduced during the implementation of SBM for the collection of segregated waste from households. However, given the gargantuan amount of waste being generated by the metropolitan city, the number of available vehicles were inadequate to be able to effectively attend to all the wards. Additionally, the vehicles underwent regular wear and tear due to

³³ <https://site.bbmp.gov.in/departmentsites/swm/>

³⁴ BBMP Letter to GAIL

³⁵ <https://axil-is.com/blogs-articles/waste-segregation/#:~:text=Failing%20to%20segregate%20trade%20waste,harmful%20gas%20into%20the%20atmosphere.>

frequent usage. Therefore, it was necessary to maintain the number of waste collection vehicles to ensure consistent coverage.

In order to widen the reach of the collection service and contribute to improve the general waste collection conditions of the city, GAIL CSR responded to the issue by assisting in the provision of a sufficient number of dry waste collection vehicles for the untapped areas.

The insured vehicles were handed over to BBMP after delivery and the municipal corporation was deemed solely responsible for the operation and maintenance of the vehicles.



Figure 3: Handing over ceremony at BBMP premises, Bengaluru

The interviewed stakeholder acknowledged the timely intervention by GAIL and highlighted the positive impact of the project of providing vehicles to help enhance the overall reach of the house-to-house segregated waste collection exercise. Additionally, the vehicles were specifically customized as per BBMP’s technical specifications and were therefore tailor-made to the municipal corporation’s requirements. This rendered the vehicles ready-to-use upon delivery and further reduced the turnaround time significantly.



Figure 4: GAIL CSR and BBMP officials flagging off the new vehicles into service together.



Figure 5: A CNG (Dual Fuel) Dry Waste collection vehicle at the hand-over ceremony.

b. Contribution to the local economy by generating employment

A major spillover impact of provisioning of these dry waste collection vehicles was the additional employment opportunities generated in terms of vehicle

drivers, vehicle attendants and ancillary workers involved in the overall process. This outcome is of utmost importance in this sector which mostly witnesses involvement of informal workers that lack legal status and protection³⁶.

While the city's garbage collection system is intended to collect 4,000 tonnes of solid waste per day, informal workers collect up to 1,050 tonnes of recyclable material per day, accounting for one-third of the city's generated waste. Each year, the engagement of about 30,000 waste pickers in the city has helped the BBMP save more than Rs. 84 crores on garbage collection and management.³⁷

Furthermore, the Solid Waste Management Rules of 2016 also mandates the municipalities to integrate the informal waste-pickers in the waste management process to ensure that they are not rendered without a livelihood upon implementation of newer waste management systems. This intervention, therefore, created the potential of including these informal sector players in the formal value chain by providing them with meaningful employment opportunities.

II. Long-Term Impacts

a. Awareness creation regarding waste segregation

The improper management of waste in cities can be attributed to the lack of capacity of ULBs as well as poor general awareness among the community regarding the necessity of solid waste management³⁸. Therefore, it is important that the community as well as the administration be kept informed about the current state of affairs and novel strategies for SWM. By measuring public involvement and awareness via knowledge gap analysis, which encourages informed decision-making, awareness-related issues can be addressed.³⁹

According to the interviewed stakeholder, the provision of vehicles by GAIL helped in increasing awareness among the communities in the city. The intervention urged people to realize and understand that a door-to-door collection system of waste segregated at source is more effective than a centralized segregation system, as substantiated by multiple studies as well.

b. Transitioning to cleaner fuel options

GAIL provided CNG (Dual Fuel) Dry Waste Collection vehicles to BBMP to aid their waste collection process. The decision to provide CNG vehicles was made after a thorough comparative analysis of vehicles of different fuel types. It was found that because of CNG's relatively lower carbon content, CNG burns cleaner than petroleum-based fuels. CNG emits 20-30% less

³⁶ Satpal Singh, "Solid Waste Management in Urban India: Imperatives for Improvement," ORF Occasional Paper No. 283, November 2020, Observer Research Foundation.

³⁷ <http://www.aicctu.org/index.php/workers-resistance/v1/workers-resistance-august-2021/migrant-waste-pickers-bengaluru-%E2%80%93-social-exclusion-and-deprivation-dignity-labor>

³⁸ D. Karthykeyan et al., Public-Private Partnership in Urban Water Supply and Municipal Solid Waste Management: Potential and Strategies (Ganesh & Co., 2012).

³⁹ Gour A. Singh S. (2022 October 27) *Solid Waste Management in India: A State-of-the-Art Review*. Environmental Engineering Research 2023. Vol 28(4).

greenhouse gas and 95% less exhaust emissions than petroleum fuels⁴⁰. Moreover, these CNG vehicles were more energy-efficient than petrol and diesel ones. Further, the dual fuel nature of these vehicles enabled their usage with both CNG and petrol. This flexibility was important given the limited number of CNG filling stations in the city.

Such an undertaking aided in the establishment of a precedent for the use of cleaner fuels in government initiatives. The transition would also encourage private entities to undertake similar initiatives.

c. Improved hygiene and sanitation in the city

The proportion of waste being disposed off in public dumping sites has decreased as a result of the better waste collection services in the selected locations. The overall surroundings of the areas improved significantly due to reduced public waste disposal, creating a cleaner and healthier environment. The potential of people in the target areas experiencing better living and health conditions as a result of a cleaner environment has also increased. In the medium term, this has the potential of reducing the overall financial burden imposed by health issues in the community. This can lead to an improvement in the economic growth and well-being of the population as they would be able to devote more time and effort to economically productive activities as a result of fewer days being lost to sickness or ill health.

1.5.7 Overall rating of the project

The scoring matrix was used to evaluate and score performance of the project across Bangalore. The following table provides the rating across the defined parameters:

Location	Relevance	Coherence	Efficiency	Effectiveness	Impact	Sustainability	Branding	Total Score
Bangalore	80%	100%	100%	100%	100%	100%	100%	97%

Table 8: Overall scoring of project

The GAIL project implemented in Bangalore scored an average of 97%. The project was aligned to GAIL’s CSR policy and SDGs and were relevant to the needs of the community. The project was efficiently executed across the selected locations within the allocated budget and timelines. The completion rate was 100% for the project.

The total score of the GAIL Project in Bangalore came to 97% due to which this project can be rated as “**Highly Impactful**” in nature.

1.5.8 Sustainability of Intervention

Sustainability assesses how well the programme secures the long-term viability of its outcomes and influence.

The continuation of a positive effect after intervention or aid has stopped is referred to as sustainability. This evaluation criterion contains key elements concerning the

⁴⁰ <https://economictimes.indiatimes.com/gail-article/can-natural-gas-help-lower-pollution-levels/articleshow/54777201.cms>

likelihood of continuous long-term benefits and risk tolerance. To achieve sustainability, a governing framework, financial model, and operating system must be established.

Upon delivery, the vehicles were handed over to the municipal corporation, with insurance coverage. Moreover, it was formally agreed between the involved parties that BBMP would be responsible for the vehicles' operation and subsequent maintenance. This demonstrates that the project had an effective exit strategy to close the project efficiently while transferring ownership of the vehicles to the authority that would be utilizing them on a regular basis. Thus, improving the authority's infrastructural capacity helped sustain the impact by facilitating them to continue with an improved waste collection approach.

The project considerably increased the municipal corporation's capability for door-to-door waste collection and attempted to reduce the amount of waste disposed of in public spaces, which affected the city's overall health and well-being conditions. The project also raised community awareness about waste segregation at the source and hygienic waste disposal methods.

1.6 Conclusion and Way Forward

Due to the waste management practices used prior to the implementation of the Swachh Bharat Mission, there was little to no comprehension of both the hazards associated with public waste disposal and the importance of segregation of waste at the source. The SBM programme adequately addressed this challenge, and the nation's total waste management system significantly improved as a result. The programme also evaluated a number of other WASH-related concerns that were directly or indirectly linked to one another, making it a comprehensive approach to address the nation's WASH problems.

This study sought to evaluate the effects of the GAIL CSR project, which provided *Swachhata* equipment, namely 18 dry waste collection vehicles, to the municipal corporation of Bengaluru for deployment in the city.

The foremost objective of the CSR intervention was to assist in achieving the SBM-set goals and enhance its overall implementation. The interviewed stakeholder voiced his appreciation and satisfaction with the project's successful execution, which assisted BBMP in improving waste collection across multiple wards within the city. The project was implemented successfully, and it has helped close existing gaps in the waste collection system that was prevalent in the area.

To further enhance the scope of the project as well as ensure the continued impact of the current project outcomes, the following recommendations can be explored:

- **Follow-up process:** After the vehicles were deployed, there was no procedure delineated to follow up with the Municipal Corporation about the operation and maintenance of the vehicles. It is suggested that GAIL follow up for at least a year after the delivery and handover to ensure that the vehicles were operating properly as well as to offer any solicited assistance.
- **Awareness generation:** For similar kinds of projects, going forward, GAIL may collaborate with the implementing agency/Municipal Corporation to include a component related to awareness generation at regular intervals in order to ensure that the community members are better aware of different aspects of waste



segregation such as wet waste and dry waste segregation, minimization of waste at source and so on. This would further aid the Municipal Corporation in ensuring smooth waste collection & segregation at the household level.

- **Monitoring and reporting:** It is suggested, from the viewpoint of monitoring and reporting, that, going forward, GAIL may coordinate with the corporation to ensure proper documentation to keep track of the procurement, delivery, and follow-up processes in order to improve the project's overall execution and oversight.



Thank you



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