Impact Assessment of CSR Project of 'Providing Services of Automatized Sweeping Collection & Transportation of Municipal Solid Waste (MSW) in Fourteen Wards of Varanasi Municipal Area

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Executive Summary

Improper disposal of solid waste in open areas and landfills results in the contamination of soil, surface water, and groundwater, as well as the generation of toxic and greenhouse gases, which have detrimental effects on both human beings and the overall environment. This lead to the spread of communicable and non-communicable diseases among humans and animals. To support Varanasi Nagar Nigam in collection and transportation of waste, PFC has extended financial assistance to implement optimal solid waste management practices and identified 14 wards. The project aimed to:

- Create an efficient and effective collection, storage and transportation system for MSW Waste in VNN
- Find sustainable solutions for waste management through community participation in establishing environmentally and economically sustainable waste management systems with the help of NGOs, CBOs and RWAs
- Ensure that lessons learned provide useful inputs in formulating the overall strategy for the city
- Change the people's perceptions towards solid waste management problems and encourage them to participate in solid waste management.
- Create an awareness campaign among the public

Outcomes

The project has provided Automatized Sweeping Collection & Transportation of Municipal Solid Waste (MSW) in 14 wards of Varanasi Municipal Area resulting in improved cleanliness resulting in beautification of the city.The project successfully implemented a range of innovative waste management techniques, including waste collection from households & streets using handcarts & auto rickshaw trollies, waste segregation at the source, transportation of waste to composting plants from primary & secondary collection points using automated sweeping and transportation vehicles and its services, composting, and recycling. These efforts not only decreased the amount of waste sent to landfills but also generated revenue from the sale of recycled materials. This approach ensured the financial sustainability of the project and created job opportunities for 1000 local people directly and many more people indirectly in 14 wards of Varanasi Nagar Nigam.

Observations

The project has resulted in high impact as automatized sweeping collection &transportation of Municipal Solid Waste resulted in beautification of the city. The following are the overall observations:

- The waste is collected through handcarts and transported to the collection vans. And later transported to Dhalao Ghar/Kuda Ghar (Secondary Transfer Station) located at 27 places (Permanent Kuda ghar-20, Temporary Kuda ghar- 04 and PCTS- 03) across the city and afterwards this waste is sent to Karsada.

- Varanasi Municipal Corporation has embraced the plastic prohibition regulations and penalties set by the Uttar Pradesh state government. Consequently, a team responsible for enforcing these rules has been established on a ward basis.
- Continuous efforts are being made by VNN to raise awareness about cleanliness, waste segregation at the source, and achieving Open Defecation Free (ODF) status through announcements made via Mike.
- Residents are reminded to use separate green and blue bins for their garbage.

CHAPTER 1
Introduction to Corporate Social Responsibility

Introduction

According to the UNIDO[1], Corporate social responsibility is a management concept whereby companies integrate social and environmental concerns in their business operations and interactions with their stakeholders. CSR is generally understood as being the way through which a company achieves a balance of economic, environmental and social imperatives (Triple-Bottom-Line Approach) while at the same time addressing the expectations of shareholders and stakeholders. In this sense, it is important to distinguish CSR, which can be a strategic business management concept, and charity, sponsorships or philanthropy. Corporate social responsibility (CSR) is one of the most central concepts in the literature and, indicates the positive impacts of businesses on their stakeholders. However, despite the growing literature on this concept, the measurement of CSR is still problematic. Although the literature provides several methods for measuring corporate social activities, almost all have some limitations.

CSR in India: The Present Scenario

The CSR provisions of the Companies Act, 2013 seek to create an enabling environment by promoting and facilitating far better connections between businesses and communities. It aims at facilitating deeper thought and long-term strategies for addressing some of our most persistent social, economic, and environmental problems; they will assist in synergizing partnerships between corporate, governments, CSOs (civil society organizations), academic institutions and social entrepreneurs. Business resources can be channelled into various programmes to address social, economic, and environmental problems and bring about a sustainable future for all. The latest Companies Act, 2013, reflects the importance of CSR as part of a companies business strategy. Section 135 contains five sub-sections on CSR. Schedule VII of the Companies Act lists out the CSR activities. Section 135 (5) CSR expenditure states that the board of every company referred to in sub-section (1) shall ensure that the company spends, in every financial year, at least two per cent of the average net profits of the company made during the three immediately preceding financial years, in pursuance of its CSR policy:

> *Provided further that if the company fails to spend such amount, the board shall, in its report made under clause (o) of sub-section (3) of section 134, specify the reasons for not spending the amount.*

1 https://www.unido.org/our-focus/advancing-economic-competitiveness/competitive-trade-capacities-and-corporate-responsibility/corporate-social-responsibility-market-integration

The various initiatives studied in each of the thrust areas of CSR are:

- Initiatives under education: maintaining school, infrastructure support, quality of education, scholarship, adult education, girl child education.
- Initiatives under health: infrastructure and equipment support, water and sanitation, senior care, maternal and child health and health camps.
- Initiatives under livelihood: skill development and income generation.
- Initiatives under environment: green initiatives, water management, water conservation.
- Initiatives under rural development: support for differently able, awareness generation, rehabilitation initiatives, infrastructure, and youth clubs.

Figure 1.1: CSR Areas

New Amendments in CSR

The Ministry of Corporate Affairs vide Notification No. G.S.R. 40(E), dated 22 January 2021, issued the Companies (Corporate Social Responsibility Policy) Amendment Rules, 2021. After 22 January 2021, the governments cleared their intention on CSR policy that do for society or is ready to pay the fine along with CSR amount. The whole concept of CSR provisions shifted from 'Give the explanations for not spending the CSR and now do the CSR activities' to 'Pay the fine for not spending the CSR and transfer the fund into National fund'. Basically, in this CSR Companies (CSR Policy) Amendment Rules, 2021, many changes came into effect such as:

- Change in the definition of CSR
- Shifting from direction to mandatory CSR obligation
- Mandatorily Registration of CSR Agency / NGO / Trust
- Change in board responsibilities
- Analysis of Impact on Society by Impact Assessment
- Introduction of 'Ongoing Project'
- Comment on Spent & Unspent CSR fund by the statutory auditor

After seeing these amended provisions of CSR, corporates have taken special care that donating to an agency /NGO/ Trust will not fulfil CSR obligation. It is the responsibility of the board to comply with all the provisions under these rules.

About Power Finance Corporation and its CSR and Sustainability Policy

PFC is a Maharatna company incorporated on July 16th, 1986. PFC is a leading Non-Banking Financial Corporation in the Country which plays a crucial role in the rise of India as a global player. PFC is rated as 'AAA' by Domestic Rating Agencies such as CRISIL, ICRA & CARE.

CSR and Sustainability Policy of PFC

- Ensure an increased level of commitment at all levels in the organisation to operate its business in an economically, socially and environmentally sustainable manner while recognizing the interests of its stakeholders.
- Generate a societal goodwill for PFC through CSR activities and help reinforce a positive & socially responsible image of PFC as a corporate.

CSR Thrust Areas

Ensuring environmental sustainability measures

Sanitation & Provision of Safe drinking water

Promoting Education and Employment enhancing vocational skills

Activities related to supporting differently abled person

Activities related to health sector

Others

Swachh Bharat Kosh

Clean Ganga Fund

PM Cares Fund

CSR and Sustainability Development Committee

The following Committee approves and recommends the projects to be undertaken by the company in CSR and SD. The committee comprises of the following members:

- Independent Director – Chairman
- Independent Director – Member
- Director (Finance) – Member
- Director (Projects) – Member
- Director (Commercial) - Member

CHAPTER 2
Scope, Approach and Methodology

The study is of descriptive in nature. A descriptive study essentially reviews whether the project has been operating as planned, scheduled and determines whether the project has achieved desired objectives, and finally analyses the outcome of the project.

Objectives and Method of Study

The major objective of the project is as follows:

- To create an efficient and effective collection, storage and transportation system for MSW Waste in VNN
- To find sustainable solutions for waste management through community participation in establishing environmentally and economically sustainable waste management systems with the help of NGOs, CBOs and RWAs
- To ensure that lessons learned provide useful inputs in formulating the overall strategy for the city
- To change the people's perceptions towards solid waste management problems and encourage them to participate in solid waste management
- To create an awareness campaign among the public

To achieve the above objectives the impact assessment criteria adopted is that of the OECD – Development Assistance Committee (DAC)Framework. The projects impact is assessed with the help of the six parameters.

Scope of work

As per the provisions of Rule 8 (3) (a) of the amended Companies (CSR Policy) Rules, impact assessment of CSR projects has to be undertaken by companies. The scope of the study covers the following:

- Impact assessment of the CSR project
- Case studies from the initiatives
- Short videos and geotagged photographs for the projects

Sample

Simple random sampling method is used for the selection of random subset of people from a larger group or population. In this method, each member of the group has an equal chance of getting selected. The method is commonly used in statistics to obtain a sample that is representative of the larger population. The sample size: total wards of the project was 14, the IPE team has chosen 5 wards for household survey, namely, 1) Dashashawmedh, 2) Bangali Tola, 3) Shiwala, 4) Jangambadi and 5) Bhadaini and each ward the team interacted with 50 households. The team visited Varanasi during 22-24, April 2024

Sl. No.	Name of the Varanasi Nagar Nigam Official	Designation
1	Dr P K Sharma	Municipal Health Officer, Varanasi Nagar Nigam
2	Shri Gajender Singh	Zonal Sanitary Officer, Varanasi Nagar Nigam
3	Shri A K Joshi	Sanitary Officer
4	Shri Sourav	Field Worker
5	Shri Anand Kumar	Field Officer
6	Smt. Sarita Yadav	Sanitary Supervisor

Sl. No.	Key Municipal Ward Personnel – Street Sweeping and Waste Collection	Total Number of Key Personnel of Wards Were Interacted
1	Safai Mitra	10
2	Sanitary Supervisors	10
3	TATA Ace drivers	04
4	Auto Tipper drivers	04
5	Handcart owners	05
6	Rickshaw trolley owners	05

Sl. No.	Name of the Ward	Total Number of Households Surveyed
1	Dashashawmedh	50 number
2	Bangali Tola	50 number
3	Shiwala	50 number
4	Jangambadi	50 number
5	Bhadaini	50 number
	Total	250

Outputs and Deliverables

The outcome of the study are as follows:

- To analyse the relevance, efficiency, and effectiveness of the project
- To provide information regarding impact assessment of the project and understand the stakeholder's perception about the project.

As a deliverable of the project, a well-structured, well-documented impact assessment report with all relevant analysis, photographs, and short videos.

CHAPTER 3
Impact Assessment of CSR Project of Providing Services of Automatized Sweeping Collection & Transportation of Municipal Solid Waste (MSW) in Fourteen Wards of Varanasi Municipal Area

Name of the Project	Impact Assessment of CSR Project of Providing services of Automatized Sweeping Collection & Transportation of Municipal Solid Waste (MSW) in Fourteen wards of Varanasi Municipal Area
Project Start and End Date	31.03.2016 and 31.3.2019
Project Cost	Rs 8.00 Crores
CSR Schedule VII Item	Sanitation including contribution to the 'Swachh Bharat Kosh' (item 1)
SDG Goal	

About the Project

The accumulation of solid waste in open areas gives rise to a breeding ground for insects and vectors, such as rats and mice, which can lead to significant health risks. In addition, it impacts public health. The accumulation of solid waste has negative consequences on the aesthetics of an area, diminishing real estate and property value. It further causes unpleasant odors, reflects a lack of organization within the community, and creates an un-favorable environment for the growth and development of society. Improper disposal of solid waste in open areas and landfills results in the contamination of soil, surface water, and groundwater, as well as the generation of toxic and greenhouse gases, which have detrimental effects on both human beings and the overall environment. This leads to the spread of communicable and non-communicable diseases among humans and animals. However, with the utilization of adequate information, resources, and efficient management practices, solid waste can be transformed into a valuable resource.

Power Finance Corporation Limited has extended financial support amounting to Rs. 8 crores to Varanasi Nagar Nigam (VNN) for the acquisition of automated sweeping collection and transportation vehicles, which include compactors, road sweeper machines, bulk refuse carriers, dumper placers, skid loaders, TATA Ace tippers, hook loaders, and more. These vehicles are utilized for the automated sweeping collection and transportation of municipal solid waste in specific fourteen wards of Varanasi Nagar Nigam. The sweeping and waste collection from these selected 14 wards are managed by TATA Ace tippers to the Kuda Ghar, where it is combined

with the Municipal Solid Waste gathered from the wards of VNN and ultimately transported to the compost plant Karsada through automated sweeping and transportation vehicles. These 14 Wards are adjacent to the 84 Ghats of the river Ganga, and the task of sweeping and garbage collection from these Wards has been delegated to a third-party agency. The project was initiated on 31.03.2016 and was completed on 31.03.2019.

Varanasi Nagar Nigam employs state-of-the-art equipment and technology for efficient street cleaning, waste collection, and transportation to designated disposal sites. Automated sweeping machines ensure thorough cleaning, while collection vehicles can handle various types of waste materials. Power Finance Corporation with NGOs, Community Based Organizations (CBOs), and Residential Welfare Associations (RWAs), Varanasi Nagar Nigam has excelled in solid waste management practices. This includes 100% door-to-door collection of municipal solid waste, transportation of waste, waste processing, treatment, as well as conducting awareness campaigns, workshops, and training sessions to educate the public on proper waste disposal and recycling. Through social media, television, radio, and community events, Varanasi Nagar Nigam spreads information on waste management practices, recycling techniques, and the benefits of sustainable waste management. The goal of this campaign is to reach a broad audience and instil a sense of urgency and responsibility towards waste management.

Need for the Project

Varanasi, situated in the Indian state of Uttar Pradesh is considered the spiritual hub of India. The city attracts pilgrims who partake in rituals by bathing in the holy waters of River Ganges and performing funeral ceremonies. The city's rich history is evident through remnants like the Rajghat plateau, showcasing archaeological discoveries dating back. Over the centuries, Varanasi has played a significant role in society, preserving its natural and cultural heritage while staying true to its traditional roots.

According to the Census 2011, the population of Varanasi stands at 11,98,491. However, as of 2018, the estimated population of Varanasi has risen to 14,41,251. Due to its abundant tourism opportunities, the city attracts an estimated daily influx of 25,000 to 30,000 tourists and pilgrims. Varanasi consistently experiences population growth, albeit with varying rates of increase from one decade to another.

In Varanasi, around 530 TPD (as per assessment by U.P. Jal Nigam, Varanasi in 2015) of waste was being generated. The door-to-door waste collection in the city was not well organized. Nagar Nigam Varanasi was making use of its own resources to collect and transport the solid waste from other parts of the city to the dumping site in addition to street sweeping. Door to door collection was only for around 10% of the solid waste before PFC's project initiated in 2016. Most of the waste generated comprises compostableand recyclable materials. This is due to the high quantum of religious and vegetable waste the city generates along with a high amount of plastic waste. The major component of the waste is organic in nature, constituting almost 41.95%. The average waste generation of Varanasi is 0.400 kg per capita per day. The city at present generates 600 MT(Approx.) of waste per day at the rate of 0.400 Kg per capita per day and decadal population growth of 2.67 per Year.

Prior to the implementation of door-to-door waste collection in Varanasi city, most residential and commercial establishments disposed of their waste outside their premises on the streets, open dumps, or in drains. This waste was then cleared by street sweepers and transported by handcart or rickshaw trolley to nearby open dumps, Dhalao, or dustbins/DP containers by the Safai Karamcharies of Nagar Nigam. This led to unsanitary conditions across the city. Door-to-door waste collection was only carried out in a few areas.

Waste Generation – Varanasi City

Year	Population	Waste generation @ per capita per day (Kgs)	Based on Total Population MT/ Day Waste Generation per day
2011	1198491	0.400	479.39
2018	1441251	0.400	576.50
2021	1559805	0.400	623.92
2031	2030047	0.450	889.74

(Source: Nagar Nigam Varanasi)

Types of Waste in Varanasi

- Biodegradable waste includes flower waste, garden waste, fruit waste, vegetable waste,food waste, cattle waste etc.
- Non-Biodegradable waste includes plastic, glass, polythene, metal, paper etc.
- Domestic Hazardous & Biomedical waste, sanitary napkins, slaughter waste, electronic waste, construction & demolition waste etc. In that, the waste can be categorized by physical characteristics such as organics, paper, plastic, glass, metal, cloths, and other residual wastes.
- Waste characterization of Varanasi shows 51.25% biodegradable waste, 15.30% recyclable waste and 33.45% other waste. Recyclable category includes Paper (32.80%), polythene (25.60%), plastic (7.30%), glass (5.70%), metal (5.80%) and others (22.80%).

PFC Initiation

With the aim of enhancing door-to-door waste collection and transportation of solid waste management practices in Nagar Nigam Varanasi, PFC extended financial assistance to implement optimal solid waste management practices and identified 14 wards near Ganga ghat. M/s IL & FS Environmental Infrastructure & Services Limited was entrusted with the task of sweeping, collecting, and transporting waste from these wards. The scope of work includes:

- MSW Sweeping (including night sweeping), collection and transportation of street waste.
- Door to Door Collection of MSW.
- Collection and transportation of drain silt.
- Complaints redressal system.
- IEC Activities - awareness about sanitation, ODF etc.
- The Project is implemented in the selected 14 wards under VARANASI NAGAR NIGAM

PFC allocated Rs. 8 crores for Nagar Nigam Varanasi to procure automated sweeping and transportation vehicles for the effective transfer of solid waste from the collection point in Shivala Kuda Ghar to the central waste processing plant in Karsada. The major objectives of the project are

to create an efficient and effective collection, storage, and transportation system for MSW Waste in VNN, to find sustainable solutions for waste management through community participation in establishing environmentally and economically sustainable waste management systems with the help of NGOs, CBOs and RWAs, to ensure that lessons learned provide useful inputs in formulating the overall strategy for the city, to change the people's perceptions towards solid waste management problems and encourage them to participate in solid waste management and to create an awareness campaign among the public.

Locations of the Project and Coverage of Household and Population for Door-to-Door Waste Collection:

S. No.	Ward No.	Name of the Ward	Number of Households covered for Door-to-Door Waste Collection	Total Population for Door-to-Door Waste collection
1	41	Kameshwar-Mahadeo	2231	11385
2	62	Rajmandir	2003	10406
3	83	Bhaironath (Kalbhairav)	2608	12939
4	63	Garhwasi Tola	2243	11274
5	49	Jangambadi	1641	8242
6	74	Dashashawmegh	2508	11892
7	78	Bangali Tola	1986	10853
8	90	Madanpura	1871	10359
9	39	Shiwala	1915	11632
10	67	Gola Dinanath	2054	11567
11	66	Prahlad Ghat	2864	15948
12	04	Raj Ghat	2098	10563
13	65	Baghara	2574	14025
14	54	Bhadaini	1694	9257

(Source: Report of the IL&FS on Municipal Solid Waste Management, VMC, 31.03.2019)

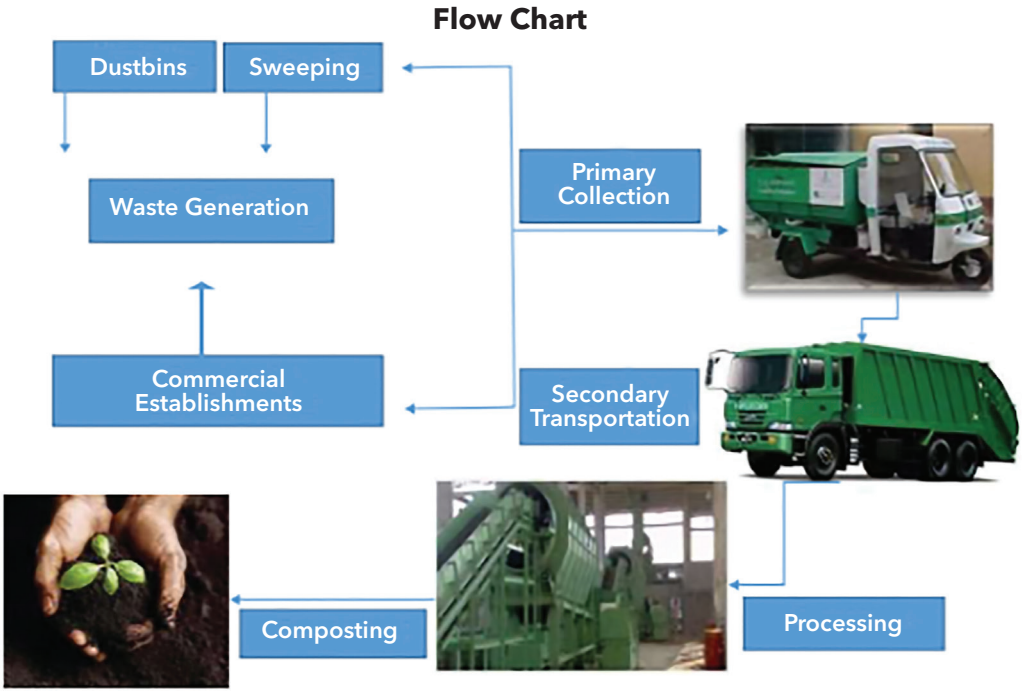


Figure 3.1: Varanasi Nagar Nigam – Solid Waste Management Process Chart

Ward Wise Waste Collection

Name of the Ward	Dry Waste per day in kgs	Wet Waste per day in kgs	Total Waste per day in kgs
Kameshwar-Mahadeo	1954	1100	3054
Rajmandir	8600	5200	13800
Bhaironath	5000	4833	9833
Garhwasi Tola	8333	3666	12000
Jangambadi	2149	4333	6482
Dashashawmegh	7100	1833	8933
Bangali Tola	8333	3333	11666
Madanpura	4600	3500	8100
Shiwala	3333	5666	9000
Gola Dinanath	4200	4333	8533
Prahlad Ghat	6333	1000	7333
Raj Ghat	1266	2000	3266
Baghara	9200	6666	15866
Bhadaini	5500	5500	11000

The waste collectors have effectively accomplished door-to-door waste collection in 14 wards of Varanasi Nagar Nigam from 31.03.2016 to 31.03.2019. They diligently visited every street within these wards to collect waste from both households and commercial establishments. To notify their arrival, they would either ring bells or blow whistles. Once they reached each street, they collected the segregated waste i.e. wet and dry categories. The tasks of Door-to-Door waste collection, Sweeping & Collection of Wards, and lifting of garbage were typically carried out in two shifts - from 06:00 AM to 02:00 PM and from 10:00 PM to 06:00 AM.

The waste/garbage gathered from the Wards, including from open points, was transported using Wheelbarrows and Tricycles, and then unloaded into Auto Tippers (Tata Ace) stationed in each ward. These Auto Tippers then transported the waste to Shivala Kuda Ghar, where it was transferred into Refused Compactors and Portable Compactors. Finally, the waste was transported to the compost plant at Karsada.

Overall Vehicles and Manpower Used for Door-to-Door Waste Collection in 14 wards

Name of the Ward	Manpower	Resources – Door-to-Door Collection			
		Rickshaw Trolley	AutoCart / Handcart	TATA Ace Tipper	Total
Kameshwar-Mahadeo	45	05	10	02	17
Rajmandir	32	00	12	02	14
Bhaironath (Kalbhairav)	65	00	17	03	20
Garhwasi Tola	64	04	13	01	18
Jangambadi	32	05	05	01	11
Dashashawmegh	64	05	14	02	21
Bangali Tola	40	03	11	01	15
Madanpura	32	06	06	02	14
Shiwala	38	06	10	02	18
Gola Dinanath	48	05	14	01	20
Prahlad Ghat	42	04	08	02	14
Raj Ghat	52	07	05	01	13
Baghara	45	05	10	2	17
Bhadaini	42	05	12	01	18

Manpower and Vehicles for Street Sweeping, Door-Door Waste Collection and Transportation of Waste in 14 wards of Nagar Nigam Varanasi

Particulars	Quantity
Manpower	730
TATA Ace Tipper	31
Refuse compactor	03
Hook Loader	02
Dumper Placer	02
Mechanical Road Sweeper	02
Skid Loader	03
Portable Compactor	04

Automatized Vehicles and various transportation vehicles are used by VNN in their Solid Waste Management Practices

Cleanliness activities / initiatives carried out by VNN

- Sweeping twice a day on general days.
- Need based cleaning/washing on festivals.
- Washing/mopping at least once every day.
- Lifting of garbage every day and transporting it to the dumping site.
- Removal of silt as and when required.
- Placing of twin bins and Shraddha Kalash (for Pooja waste material) after every 30m-50m.

Process of Waste Collection and Transportation: Waste is collected from the various wards and Ghats and taken to designated locations like Sankatha Ghat, Rana Mahal Ghat, Pandey Ghat, Panchaganga Ghat, Shitala Ghat, Gola Ghat, and Prahalada Ghat. By using tricycles and the waste is moved to the Auto Tippers (Tata Ace) and later transported to waste stations located in at Harishchadra Ghat, Dasashwamedh Ghat, and Khirkia Ghat and later transferred to Compactors. Finally, the waste is transported to the compost plant at Karsada.Around 250 stainless steel twin bins (100-liter capacity) have been installed at the Ghats.

VNN organized informative sessions on the significance of maintaining cleanliness, the importance of having open defecation free areas, and the proper segregation of dry and wet waste. These sessions also emphasized the use of blue color dustbins for dry waste segregation and green color dustbins for wet waste segregation. To create awareness among the local community regarding wet and dry waste segregation, many camps were conducted. The VNN also distributed Dustbins for enhancing the segregation of waste at source amongst residents. Street playswereorganised by Swachh Gali Abhiyan (NGO), featuring children performing about sanitation in Dashaswamedh ward. A speech competition was organized by as part of the "Swachh Ganga Pakhwada" initiative.

Swachhta Campaign on Clean Ganga Programme conducted by VNN.

Swachhtha Cycle Rally from AssiGhat to VNN Headquarters at Sigra was organised where 70 enthusiastic cyclists participated. The theme of the rally was to create awareness among the people about cleanliness and hygiene. The message for all citizens was that if everyonetried to keep his own environment clean, towns and cities would automatically become cleaner and healthier.

Impact Assessment

Relevance: The PFC's provided Automatized Sweeping Collection & Transportation of Municipal Solid Waste (MSW) in 14 wards of Varanasi Nagar Nigamaligns with the CSR policy that supports

the Swachh Bharat Abhiyan-Urban Local Bodies initiative, which was initiated by Government of India in 2014 to modernize Solid Waste Management Practices and enhance the capacity of solid waste management practices in Varanasi City. Due to insufficient funds, lack of door-to-door waste collection methods & strategies and outdated sweeping and transportation led to poor performance in Solid Waste Management Practices. However, with the financial support of Rs.8 crores from PFC, Varanasi Nagar Nigam was able to acquire modern sweeping and transportation technologies, mobilize human resources, and improve solid waste management practices. The main objective of the project included collection & transportation of drain silt, door-to-door waste collection, transportation to processing plants for recycling bio-degradable waste into usable manure for trees and plants, and disposal of non-biodegradable waste through landfill operations. As a result, this project significantly enhanced the solid waste management practices at Varanasi Nagar Nigam Limited by improving cleanliness in selected 14 wards of Varanasi Nagar Nigam and along the ghats of the river Ganga.

Efficiency: The project was effectively completed within the expected budget and timeline of three years, showcasing the efficient management and utilization of resources. It successfully enhanced the operational solid waste management practices of Varanasi Nagar Nigam and promoted the best practices of waste management and provided easy collection and transportation mechanisms.

One of the key achievements of the project was efficient utilization of manpower and machinery in 14 wards of VNN. Skilled personnel were hired and trained to handle waste disposal activities, ensuring that the workforce was well-equipped to handle the task at hand. Additionally, the project procured modern machinery and equipment, such as waste collection vehicles, compactors, and recycling units, which were effectively utilized to streamline waste management operations.

The project focused on the disposal of various types of waste, including household waste, street waste, and waste from the ghats of the Ganga River. By addressing these different sources of waste, the project aimed to tackle the diverse waste management challenges faced by the city. It implemented systematic waste collection and transportation processes, ensuring that waste was promptly and efficiently removed from households, streets, and the river ghats.

Furthermore, the project emphasized the importance of decentralized processing and treatment of waste. It established decentralized waste processing units in different parts of the city, which helped in reducing the burden on centralized waste treatment facilities. This approach not only improved waste management practices but also contributed to environmental sustainability by minimizing the amount of waste sent to landfills.

Overall, the successful completion of the project within the expected budget and timeline demonstrated effective project management and a commitment to improving solid waste management practices. By acquiring and efficiently using manpower and machinery, addressing various sources of waste, and implementing decentralized waste processing, the project significantly enhanced the operational solid waste management practices of Varanasi Nagar Nigam.

Effectiveness: The project successfully met its goal of achieving 100% door-to-door waste collection, removing street waste and drain silts, serving around 30,290 households and a

population of 160,342 across 14 wards. It also effectively managed the disposal of municipal, industrial, commercial, hospital, and other types of waste, leading to enhanced cleanliness in streets, ghats, parks, commercial areas, and more. Additionally, the project acquired automated sweeping and transportation vehicles for VNN to facilitate the transfer of waste from primary collection points to secondary transfer stations and the central processing facility, Kasada.

Coherence: The intervention is compatible with Government of India's prestigious initiative Swachh Bharat Abhiyan Urban focusing on elimination of open defecation, conversion of unsanitary toilets to pour flush toilets, eradication of manual scavenging, municipal solid waste management and bringing about a behavioural change in people regarding healthy sanitation practices. This project also completely supported the clean ganga activities, Swachh Ganga - Swachh Kashi Initiative. This project also adopts the Solid Waste Management Rules, 2016.

Impact: The project successfully implemented a range of innovative waste management techniques, including waste collection from households & streets using handcarts & auto rickshaw trollies, waste segregation at the source, transportation of waste to composting plants from primary & secondary collection points using automated sweeping and transportation vehicles and its services, composting, and recycling. These efforts not only decreased the amount of waste sent to landfills but also generated revenue from the sale of recycled materials. This approach ensured the financial sustainability of the project and created job opportunities for 1000 local people directly and many more people indirectly in 14 wards of Varanasi Nagar Nigam.

The project organized extensive awareness campaigns and educational programs to educate the community on the importance of waste management and the negative impacts of improper waste disposal. As a result, there was a noticeable shift in behavior, with residents actively participating in waste segregation and adopting sustainable practices in their daily routines. Furthermore, the project collaborated with local businesses and industries to implement sustainable waste management practices, reducing their environmental footprint and promoting a circular economy. These initiatives not only enhanced the cleanliness of the area but also bolstered the community's reputation as an environmentally conscious and responsible region.

Additionally, the project established partnerships with NGOs and government agencies to ensure the proper disposal of hazardous waste, such as medical waste from hospitals and industrial waste from factories. Furthermore, the project introduced a monitoring and evaluation system to track the progress and effectiveness of waste management initiatives. This allowed for continuous improvement and the identification of areas that required further attention.

Ultimately, this project enabled VNN to compost 300 tonnes of waste, effectively diverting it from landfills and transforming it into useful manure. This significant achievement not only reduced the amount of waste that would have otherwise ended up in landfills, but also provided a sustainable solution for organic waste management. As the waste decomposed, it underwent a natural transformation, turning into nutrient-rich compost that could be used as a fertilizer in various agricultural and horticultural applications. This high-quality manure not only provided essential nutrients to plants but also improved soil structure and water retention, promoting healthier and more sustainable growth. The successful composting of 300 tons of waste not only had environmental benefits but also had positive economic implications. By diverting waste

from landfills, VNN reduced the need for costly waste disposal methods, such as landfilling or incineration. Additionally, the production of valuable compost created a new revenue stream for the VNN, as it could be sold to farmers, landscapers, and other agricultural businesses.

Moreover, the project raised awareness about the importance of waste management and the potential of composting as a sustainable solution. By showcasing the successful transformation of waste into valuable resources, VNN inspired other individuals, businesses, and communities to adopt similar practices. This ripple effect could lead to a significant reduction in waste generation and a shift towards more sustainable waste management practices on a larger scale.

Overall, the project's success in achieving its objectives and creating a cleaner and healthier environment for the community has served as a model for other regions facing similar waste management challenges. It has not only improved the quality of life for residents but also contributed to the preservation of the Ganga River and its surrounding ecosystem.

Varanasi City Performance – Swachh Survekshan results

S. No.	Year	Varanasi City Rank	Total Number of Cities Participated
1	2017	32	434 cities (population less than two lakhs to more than ten lakhs of population of cities)
2	2018	27	More than one lakh population of 100 cities
3	2019	70	More than one lakh population of 100 cities

Sustainability: The project results are enduring, with the VNN receiving adequate funding periodically from various sources, such as the government, corporate CSR funds, private entities, and others, to enhance top-notch municipal solid waste management practicesin VNN. This has led to the highest level of performance in solid waste management practices compared to other cities nationwide.

Project Outcomes

Municipal Solid Waste from 2016-17 to 2018-19 year wise in 14 wards

S. No.	Year	Municipal Solid Waste in Metric Tons
1	2016-17	1267
2	2017-18	1761
3	2018-19	2175.5
4	2019-20	3000

Centralized Method: This method involves collection of municipal waste from all over the local area and by means of land filling, dump outside the city Panchayat limits. This process looks at door-to-door collection of solid waste by waste pickers who hand over to the collection team who then discard the collected waste in the landfill. The waste pickers are employees of the Municipal Corporation.

One Centralized waste processing plant available in Varanasi on 31.03.2019.

Plant Name: Karsada MSW Plant.

Plant Type: Centralized MSW Waste to Compost Plant.

Technology:- Aerobic Digestion (Windows-Composting)

Location: Outside the Municipal boundary limits of Varanasi Municipal Corporation.

Operating Agency: M/s. IL & FS Environmental Infrastructure and Services Limited.

Plant capacity: - 600 MTD (Approx)

Presently Processing for compost in tons per day Approx: 300 tons per day

Compost sales in tons per day: 1.43

Deposited into scientific landfill in tons per day: 92.18

The status of the Project on 31.03.2019

- 300.00 TPD of wet waste was being processed daily
- 40TPD of compost is produced daily and sold to Indo-gulf Fertilizers and Kribhco Fertilizers.
- 158 TPD of RDF was generated daily sent to ACC cement factory
- 102.60 TPD (sand/silt/stone/ceramics) was dumped into scientific landfill daily.
- Leachate was sprinkled on compost product.

Beneficiary households during 2019-20 in VNN

S. No.	Total Households of VNN- Expected	Total Population of VNN – Expected	Beneficiary Households in 14 Wards	Beneficiary Population in 14 Wards
1	248300	1441251	30290	160342

Impact Matrix

The project's overall impact is analyzed by studying its relevance, efficiency, effectiveness, coherence, impact, and sustainability.

Impact (Rating)	1 (Very Low)	2 (Low)	3 (Moderate)	4 (High)	5 (Very High)
Relevance					
Efficiency					
Effectiveness					
Coherence					
Impact					
Sustainability					

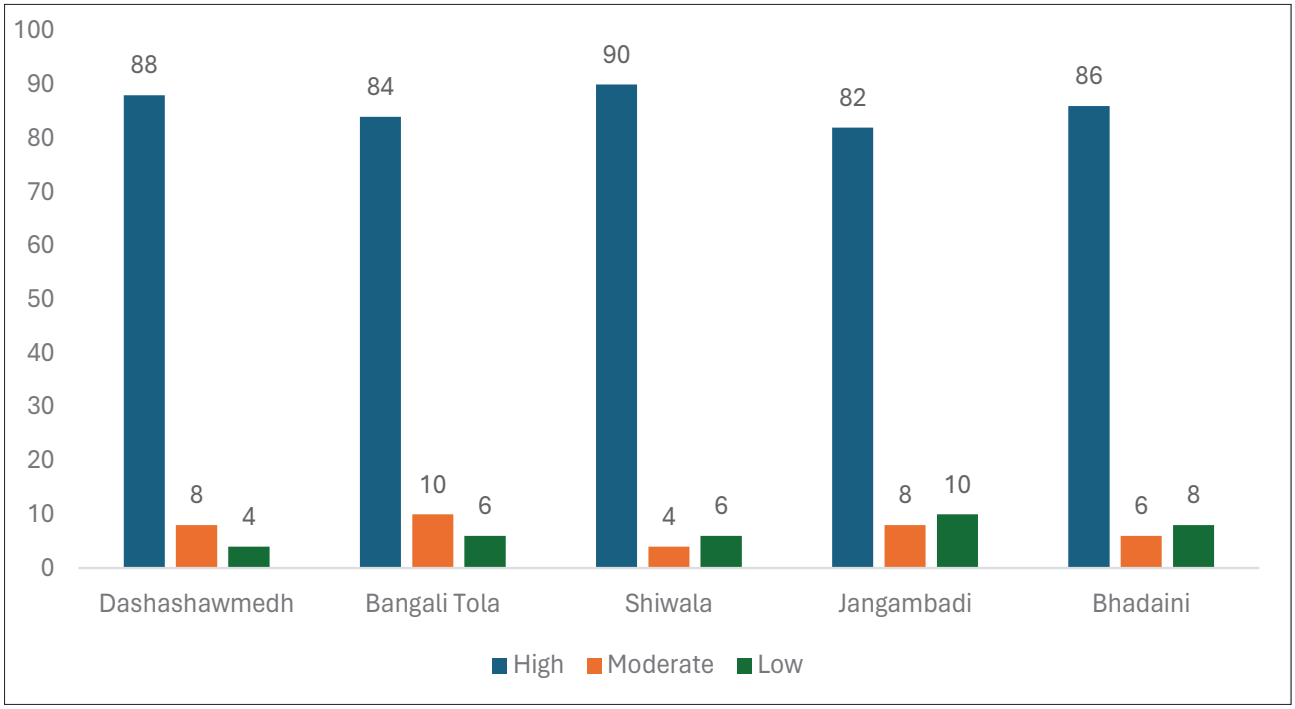
Data Analysis

To assess the impact of the PFC project on Impact Assessment of CSR Project of Providing services of Automatized Sweeping Collection & Transportation of Municipal Solid Waste (MSW) in Fourteen wards of Varanasi Municipal Area, the IPE team interacted with VNN municipal authorities, VNN personnel, Citizens of Varanasi city and conducted a individual and focused ground discussion. The team also circulated 250 questionnaires to citizens of Varanasi in selected 5 municipal wards and each ward consisted of the sample size of 50. The project ultimately got intended outcomes and improved the sanitation facilities in the city as found in this survey.

Beneficiary Stakeholder Satisfaction Levels

The Beneficiary Stakeholders includes households, Small business holders, daily labour, government & private employees, students, retired people.

Door-to-Door waste Collection

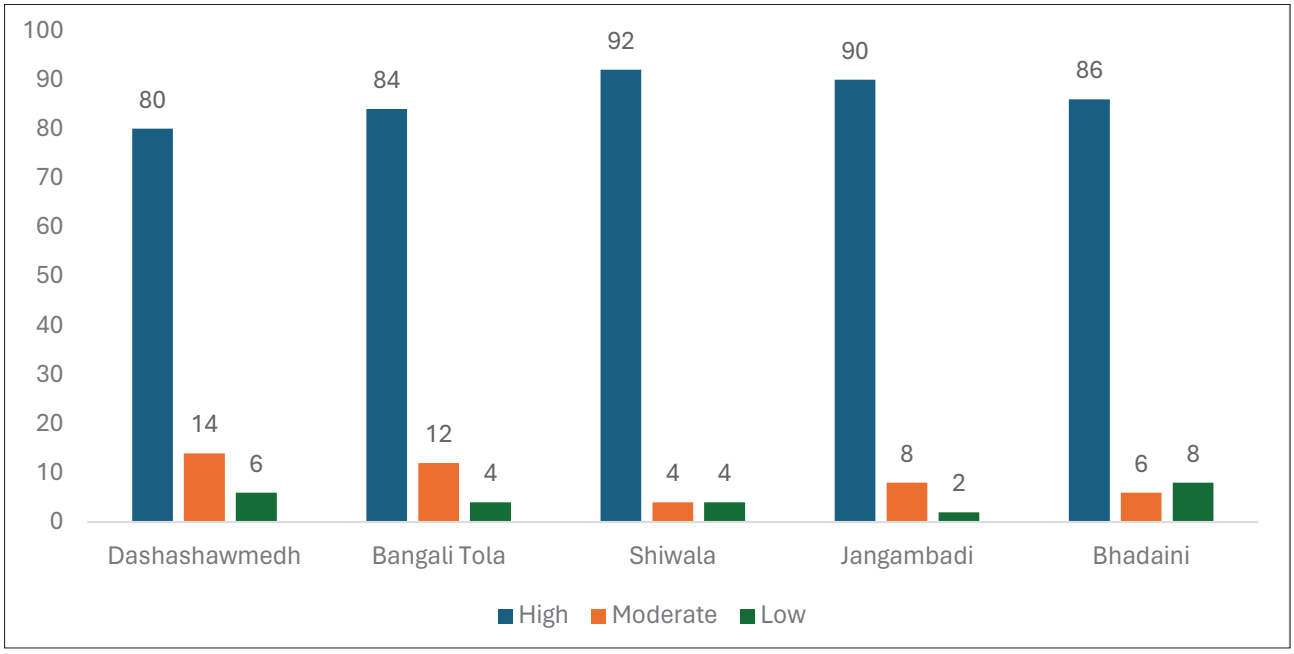


The IPE team interacted with 50 households in each of the 5 wards of Varanasi Nagar Nigam, where PFC CSR funds were utilized to enhance solid waste management practices. These wards are Dashashwamedh, Bangali Tola, Shiwala, Jangambadi, and Bhadaini. Shiwala stood out with the highest percentage of high satisfaction rate of 90% among the 5 wards, especially in terms of door-to-door waste collection methods. The satisfaction rate for respondents in the other 4 wards ranged from 82% to 88%. Most beneficiaries shared that prior to the PFC project in 2016, households in these wards relied on public dustbins or open dump areas for waste disposal due to the absence of door-to-door waste collection services. However, since the project's inception in 2016, VNN has enhanced its door-to-door waste collection services. Consequently, households in these wards now segregate dry and wet waste and hand it over to VNN's authorized waste collectors. Municipal waste collectors visit households with hand carts between 6.00 am and 10.00 am to collect the waste. VNN charges Rs. 50 per month from each household for municipal waste collection services.In Bangali Tola, 10% of respondents expressed moderate satisfaction.

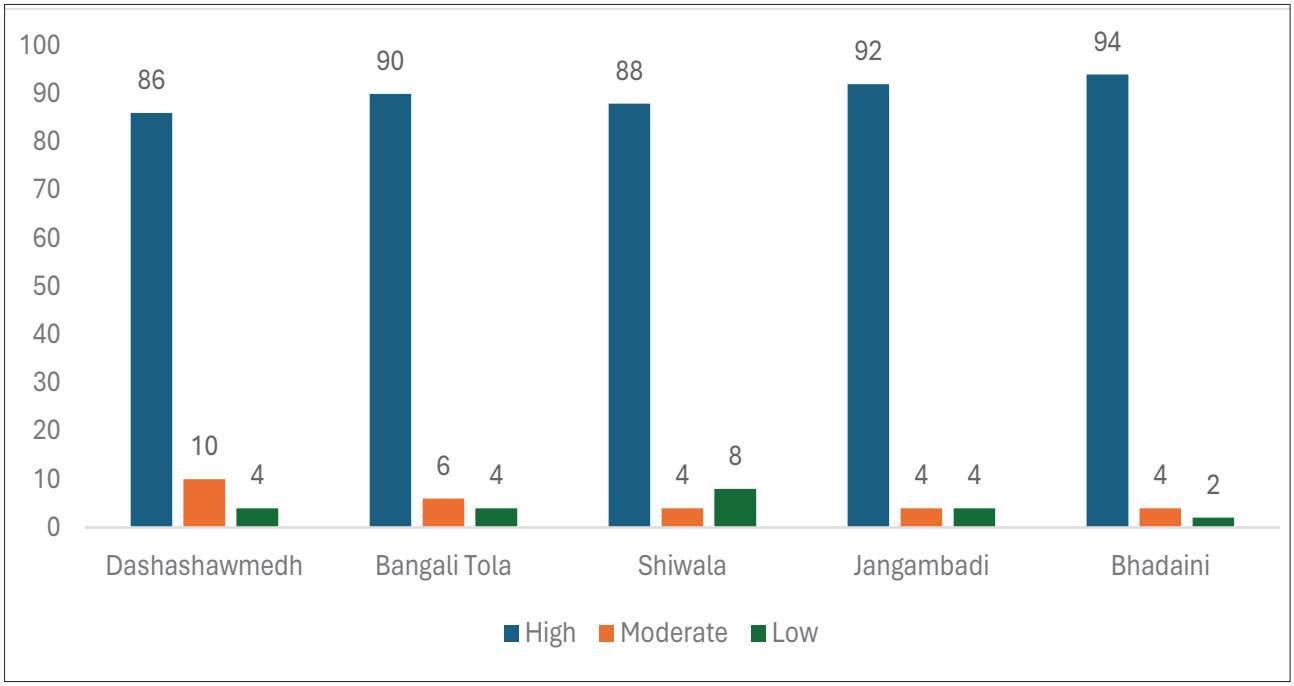
Automatized Sweeping collection and Transportation Facilities for Municipal Solid Waste

The respondents of Shiwala ward expressed a high satisfaction rate of 92% for the automated sweeping collection and transportation services for Municipal Solid Waste. These services were utilized to transport waste from secondary collection points (Kuda Ghar) to the Compost Plant-Karsada. Furthermore, beneficiaries from the remaining 4 wards also expressed their satisfaction, ranging between 80% to 90%. However, some beneficiaries pointed out that only 50% of the solid waste could be transported to the compost plant from secondary waste collection centers due to

the unavailability of refuse compactors, dumpers, dumper placers, tractors with trolleys, JCB/Escort loaders, and road sweeping machines. Consequently, manual loading and unloading became necessary, requiring a significant amount of manpower and time. As a result, the VNN was unable to maximize the recycling of municipal solid waste and the production of usable manure before 2016. However, significant changes occurred after 2016 when the VNN acquired various types of automated sweeping collection and transportation vehicles, resulting in remarkable reductions in landfills and increased production of usable manure.14% of respondents from Dashashawmedh expressed moderate satisfaction.

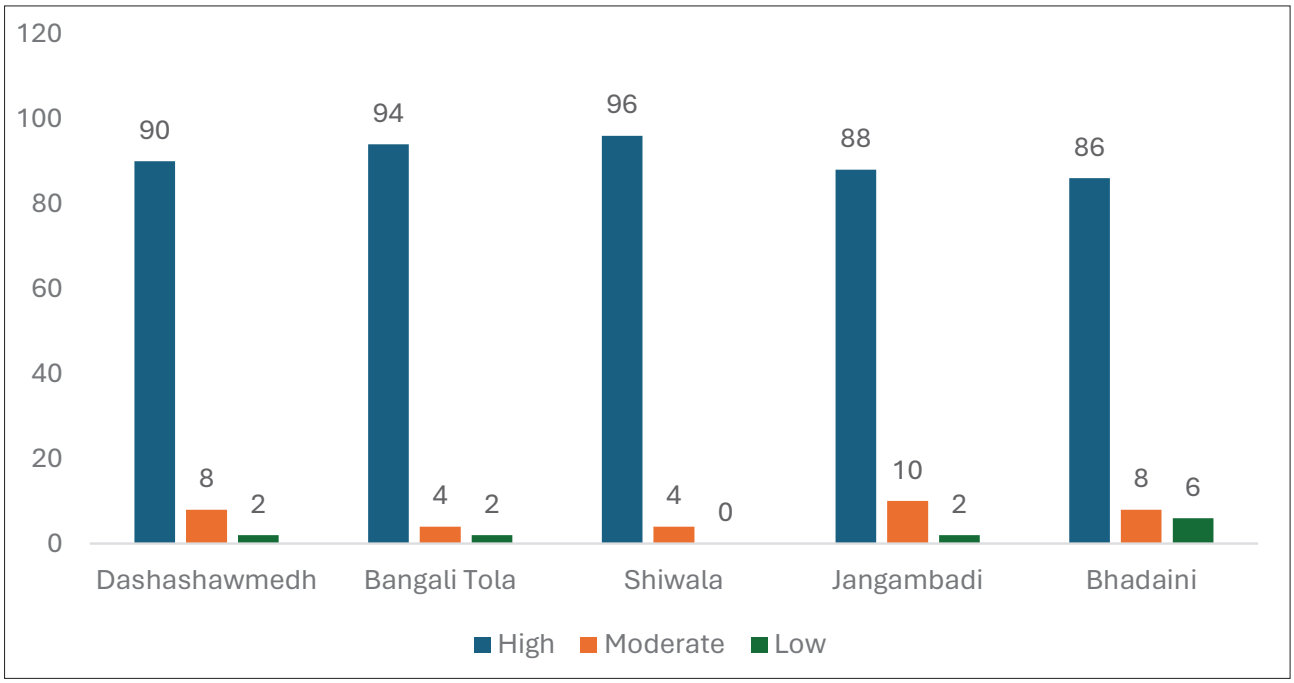


Street Cleaning and Drains Cleansing in Varanasi City



94% of beneficiaries from Bhadaini expressed their high satisfaction with the street cleaning and drains cleansing, which was the highest percentage of high satisfaction rate among all five wards. Respondents from the other four wards showed satisfaction levels ranging from 86% to 92%. Prior to 2016, beneficiaries often complained about the lack of cleanliness in the streets and drains, resulting in unsanitary conditions and drain blockages that negatively affected public health. However, after 2016, improvements were seen due to the implementation of new technologies and increased cleaning staff.10% of respondents from Dashashawmedh reported moderate satisfaction.

Availability of Dustbins at Public Places and various ghats of Ganga River in Varanasi City



The satisfaction level regarding the availability of dustbins at public places in Shiwala ward was expressed by 96% of the respondents. This high satisfaction rate was also observed in the other four wards, ranging between 86% and 94%. The Varanasi Nagar Nigam (VNN) has placed dustbins with a capacity of 100 liters at various public places, including parks, markets, bus stands, important locations, and along the ghat areas of the Ganga River. To ensure cleanliness, the cleaning personnel are deployed in three shifts round the clock at important places throughout the entire Varanasi city area. VNN has also taken initiatives to raise awareness among the citizens of Varanasi and tourists about the proper usage of public dustbins to maintain cleanliness in the surrounding areas. As a result of these efforts, the sanitation facilities in the ghat areas and public places of the Varanasi municipality area have significantly improved. 10% of respondents from Jangambadi were moderately satisfied.

Observations

- 350 dustbins various capacities were placed in 14 wards.
- At each ward, Ward Swachhta Protsahan Samiti was established to ensure 100% door-to-door collection, as well as decentralized processing and treatment of waste. These committees at the ward level also supervised the activities related to solid waste management (SWM).

- The waste is collected through handcarts and transported to the collection vans. And later transported to Dhalao Ghar/Kuda Ghar(Secondary Transfer Station) located at 27 places (Permanent Kuda ghar-20, Temporary Kuda ghar- 04 and PCTS- 03) across the city and afterwards this waste is sent to Karsada.
- AsVaranasi is home to numerous religious institutions, including temples, mosques, and churches, where worshippers gather to offer prayers. Temples and mosques produce a significant amount of organic waste in the form of used flowers. The Varanasi Nagar Nigam has found a sustainable solution by repurposing these flowers for making incense sticks and compost.
- Varanasi Municipal Corporation has embraced the plastic prohibition regulations and penalties set by the Uttar Pradesh state government. Consequently, a team responsible for enforcing these rules has been established on a ward basis.
- Continuous efforts are being made by VNN to raise awareness about cleanliness, waste segregation at the source, and achieving Open Defecation Free (ODF) status through announcements made via Mike. Residents are reminded to use separate green and blue bins for their garbage. Upon receiving a signal from waste collecting workers blowing a whistle, segregated waste should be placed in wheelbarrows or tricycles.

Case Studies

Case Study 1

Varanasi Nagar Nigam has implemented effective solid waste management practices to maintain cleanliness and hygiene in the surrounding areas of the Ganga ghats. The VNN has deployed a team of waste collectors, sweepers, and boat waste collectors who actively participate in cleaning the ghats and removing waste from the river water. This initiative aims to enhance sanitation facilities along the entire stretch of the Ganga River ghats, considering the significant number of tourists who visit daily for bathing and religious rituals, which hold great importance in Hindu religion. Additionally, the VNN has strategically placed large dust bins (100 litres) along the ghats to discourage littering in open spaces, resulting in improved sanitation practices among both citizens and tourists. The waste collectors collect street waste and other types of waste using handcarts or rickshaw trolleys, which are then transported to the primary collection center, Kuda Ghar. Here, where all the waste from the 14 wards is combined and taken away twice daily by TATA Ace tippers. During festivals, the VNN deploys additional cleaning personnel to ensure round-the-clock cleanliness in the Ganga ghat areas. These concerted efforts by the VNN have successfully maintained cleanliness and hygiene in the surrounding areas of the various Ganga ghats.

- **Mr Radheshyam**

Tea Stall Owner, Ganghamehal ghat, Shiwala Ward

Case Study 2

VNN strongly encourages households to dispose of their household waste on a daily basis in order to maintain a clean environment. Additionally, VNN emphasizes the importance of cleaning streets and removing silt from drains. These practices are essential for VNN to provide better

sanitation facilities to the public. Waste Collectors, employed by Varanasi Waste Solution Private Limited, work on behalf of VNN to collect various types of waste from households in Varanasi. They arrive at our household at 7.30 am and collect the segregated household waste using a hand cart. In our family of 17 members, we contribute 2 kgs of dry waste in the blue dust bin and half a kg of wet waste in the green dust bin. Previously, due to the absence of door-to-door waste collection methods, we had to rely on nearby public dust bins, resulting in unhygienic conditions and numerous health issues for the public. However, with the implementation of systematic door-to-door waste collection methods, automated sweeping, collection and transportation of different types of waste, separation of biodegradable and non-biodegradable waste, and recycling processes, VNN has significantly improved sanitation facilities and public health.

- **Mr Mangal Prasad**

Retired Person, Gauriganj locality, VNN

About the Centre for Corporate Social Responsibility (CCSR)

The Centre for Corporate Social Responsibility (CCSR) was set up during 2011 to promote training, research, consultancy assignments and document case studies in thrust areas of CSR. The Centre works on the existing body of knowledge, systems, structures, models, and mechanisms associated with diff erent CSR initiatives; it also provides a platform for discussing CSR guidelines and the latest developments in the fi eld. The Institute of Public Enterprise (IPE) has been part of the Department of Public Enterprises (DPE), Government of India initiative on introducing Corporate Social Responsibility (CSR) as an element of the performance matrix in Central Public Sector Enterprises (CPSEs). IPE was invited to attend the meetings of the Working Group on CSR in 2007-08 and 2009-10, and was nominated by DPE as a Member of the Executive Committee on CSR in 2011 to develop, design, and implement courses for CPSEs. Recognizing the importance of the subject and also the realization that there is a dearth of experts in this emerging fi eld, it was decided that IPE could play a major role in research, development, and advocacy of CSR. This idea led to the establishment of the Center for Corporate Social Responsibility in 2011 at IPE.

The main objectives of the center:

- To conduct interdisciplinary and collaborative research and document case studies in thrust areas of CSR dealing with contemporary issues and challenges.
- To integrate the existing body of knowledge, systems, structures, models, and mechanisms associated with diff erent CSR initiatives by interfacing with industry and academia.
- To disseminate information about the latest happenings in the CSR fi eld to the people engaged in policy making, policy analysis, policy research, practitioners, and other stakeholders.

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About Institute of Public Enterprise (IPE)

The Institute of Public Enterprise (IPE) was established in 1964 as an autonomous non-profit society. IPE is a premier AICTE approved management Institute focusing on transforming students into leaders of tomorrow in organizations and society. IPE's key objectives include management education, research, consultancy, and training. In 1995, the Institute launched its first two year full-time Post Graduate Diploma in Management (PGDM) programme to provide skilled human resources to meet the requirements of industry.

Keeping in view the market demand, the Institute also launched sector specific PGDM programs in the areas of Marketing, Banking Insurance and Financial Services, International Business and Human Resource Management. IPE's engagement with long-term management education has received wide appreciation from the industry, government, and social sector enterprises. The Institute continuously endeavours to update the content and teaching methodology of its courses based on feedback from the end-users, ensuring the quality, relevance, and utility of all its programs and courses.

IPE is consistently ranked among the leading B-Schools in India in most well-known ranking surveys. IPE has also been awarded a premium accreditation label of the SAARC region, 'The South Asian Quality Assurance System' (SAQS). Over the years IPE has won several awards and honours for its academic & research excellence.

IPE has a very successful track record of running MDPs over a long period of time. IPE also has a strong Research and Consultancy division, which provide consulting services and undertakes research projects for various national organizations. The Institute has been recognized as a 'Center of Excellence' by the Indian Council of Social Science Research (ICSSR), Ministry of Education, and Government of India.

The Governance of the Institute is overseen through a Board of Governors composed of eminent policy makers, academicians, and CEOs of public and private sector enterprises.

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