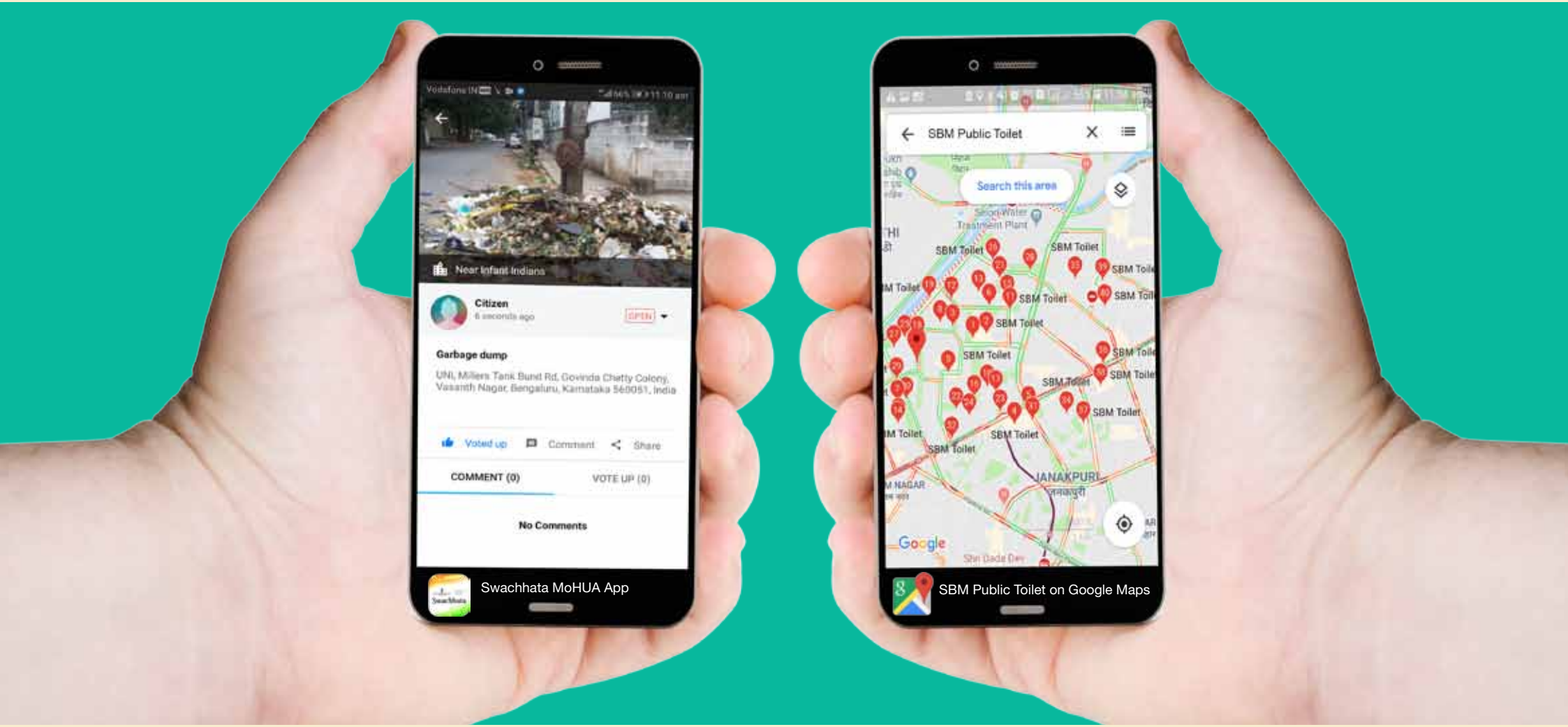
Ministry of Housing and Urban Affairs
Government of India



TRANSFORMING URBAN LANDSCAPES OF INDIA

Success Stories in Information & Communications Technology (ICT)

SWACHH BHARAT MISSION (URBAN)

Ministry of Housing and Urban Affairs
Government of India

TRANSFORMING URBAN LANDSCAPES OF INDIA

Success Stories in Information & Communications Technology (ICT)

SWACHH BHARAT MISSION (URBAN)

MESSAGE

HARDEEP S PURI

Minister of State (Independent Charge) - Housing & Urban Affairs

हरदीप एस पुरी
HARDEEP S PURI

सत्यमेव जयते

आवासन और शहरी कार्य
राज्य मंत्री (स्वतंत्र प्रभार)
भारत सरकार
MINISTER OF STATE (I/C)
HOUSING AND URBAN AFFAIRS
GOVERNMENT OF INDIA

Message

When Hon'ble Prime Minister launched the Swachh Bharat Mission (Urban) in 2014, it was with the twin objective of making India open defecation free along with 100% scientific management of solid waste by 2019. Today, it gives me great pride to see that the Mission is on its way to achieving its intended objectives. What gives me greater pleasure is the fact that the Mission has progressed from being target oriented to focusing on holistic and sustainable outcomes. One of the ways in which this has been achieved is through the effective use of Information and Communications Technology (ICT). By embracing effective technological solutions, the Ministry has not just been able to monitor the Mission outcomes better but also make it easier for the common citizen to engage with the Mission.

This book, the third in the series on 'Transforming Urban Landscapes of India' is a compilation of effective ICT interventions that the Mission has seen in the last few years. While some of the interventions have been helmed by the Ministry at the national level, other initiatives have been successfully adopted in cities, thus enabling them to deal with their issues of sanitation and solid waste management more effectively.

I can say with certainty that this book, like its predecessors, will serve as an inspiration for other cities to innovate and adopt effective ICT tools. I congratulate my team at the Ministry and the cities who are bringing to the fore technological innovations that I am sure will lead to simpler, faster hassle-free solutions thus leading to a Swachh and a Smart India.

(Hardeep S Puri)

New Delhi
26 February 2019

Office : Room No. 104-C, Nirman Bhawan, New Delhi-110011; Phone : 011-23061166, 23061162, 23062089 (Fax)

FOREWORD

DURGA SHANKER MISHRA

Secretary, Ministry of Housing & Urban Affairs

दुर्गा शंकर मिश्र
सचिव
Durga Shanker Mishra
Secretary

भारत सरकार
आवासन और शहरी कार्य मंत्रालय
निर्माण भवन, नई दिल्ली–110011
Government of India
Ministry of Housing and Urban Affairs
Nirman Bhawan, New Delhi-110011

Foreword

The four year journey of Swachh Bharat Mission (Urban) has already seen 4140 cities / towns (more than 94% towns/cities) becoming Open Defecation Free (ODF), with nearly 95% of Individual Household Toilets (IHHL) and more than 100% of Community and Public Toilets constructed against target. Parallely, significant strides have been made in Solid Waste Management. This success has been possible due to massive involvement of citizens, and concurrent adaptation of technology.

The Ministry of Housing and Urban Affairs, in an effort to document these studies, has introduced a series on: 'Transforming Urban Landscapes of India'. The present book, the third in the series, focuses on the theme of Information & Communications Technology (ICT), and has compiled ICT interventions that have significantly strengthened the Swachh Bharat Mission, both in terms of implementation and outcomes. These case studies presented here demonstrate how technological interventions coupled with proactive governance and citizen participation are leading to improved service delivery on sanitation and solid waste management. This compilation is another example of the efforts of Urban Local Bodies (ULBs) to ensure a cleaner India by October 2019, the 150th birth anniversary of the Father of the Nation.

I am confident that other Urban Local Bodies will benefit from these initiatives and replicate these with suitable adaptation in ICT to enable better decision making and increased efficiency, especially in Solid Waste Management, under the Swachh Bharat Mission (Urban).

(Durga Shanker Mishra)

New Delhi
26 February, 2019

Office Address: Room No. 122 'C' Wing, Nirman Bhawan, New Delhi-110011
Tel.: 011-23062377, 23061179; Fax: 011-23061459; Email: secyurban@nic.in
Website: www.mohua.gov.in

PREFACE

वी. के. जिन्दल
संयुक्त सचिव एवं मिशन निदेशक
V. K. JINDAL, ICoAS
Joint Secretary & Mission Director
Swachh Bharat Mission
Tel : (011) 23061630
E-mail: vk.jindal@nic.in

भारत सरकार
आवासन और शहरी कार्य मंत्रालय
निर्माण भवन
GOVERNMENT OF INDIA
MINISTRY OF HOUSING AND URBAN AFFAIRS
NIRMAN BHAWAN

नई दिल्ली-110011, तारीख 20
New Delhi-110011, dated the 20

PREFACE

Hon'ble Prime Minister of India, Shri. Narendra Modi launched the Swachh Bharat Mission with the aim of making India Clean and Open Defecation Free (ODF) by 2nd October 2019.

Right from its inception, the Swachh Bharat Mission has been witness to many inspiring stories among cities, civil society organizations, large establishments and individuals. In our endeavor to disseminate these stories to a larger audience, we are releasing the 4th edition of the '**Transforming Urban Landscapes of India**', which focuses on the best practices followed by cities in the area of Information & Communication Technology (ICT).

At MoHUA, we have always been encouraging cities in the use of ICT in order to improve their operational efficiency and maximize service delivery to citizens. Cities too have responded with fervor and dedication in making use of technology. In fact, technology has been successfully and efficiently used by many cities across the country resulting in a visible change in their sanitation and solid waste management scenario.

We have handpicked success stories wherein an idea at the national or city level has evolved into a successful ICT innovation that has resulted in transforming service delivery to its citizens and the waste management practices for the success of Swachh Bharat Mission – Urban. These success stories have been compiled in this edition of the series, to disseminate knowledge about innovative ICT lead solutions which can be replicated and / or scaled up by other cities, thus contributing to the sustainability of Swachh Bharat Mission.

I would like to acknowledge the details and photographs made available by the Municipal Corporations of Bengaluru, Vijayawada, Surat, Vapi, Bhopal, Indore, Navi Mumbai, New Delhi and other organizations so as to bring out the book in this format.

I am sure that there are more such stories which need to be brought forward and disseminated. The series in its next edition will cover more cities to enable emulation of these good practices all over the country.

We hope this book will not just bring laurels to these lighthouse cities but will also be a guiding document for others to follow.

V. K. Jindal

(V.K. JINDAL)

New Delhi
28th February, 2019

VINOD KUMAR JINDAL

Joint Secretary & National Mission Director,
Swachh Bharat Mission (Urban)
Ministry of Housing & Urban Affairs

CONTENTS

NATIONAL LEVEL INTERVENTIONS

SBM PUBLIC TOILETS ON GOOGLE MAPS

Google Toilet Locator (GTL)

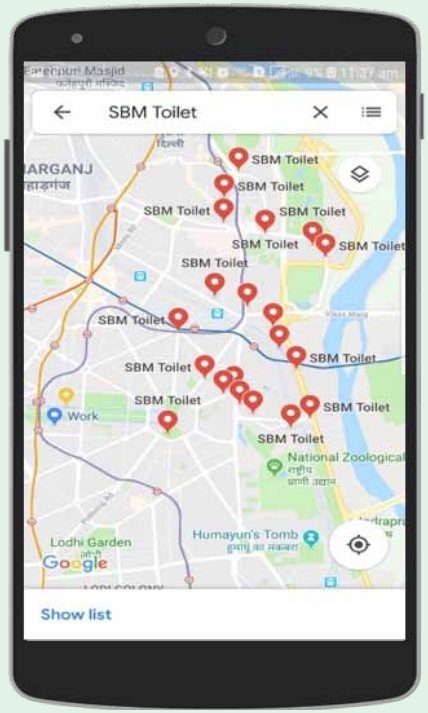
SWACHHATA MoHUA APP

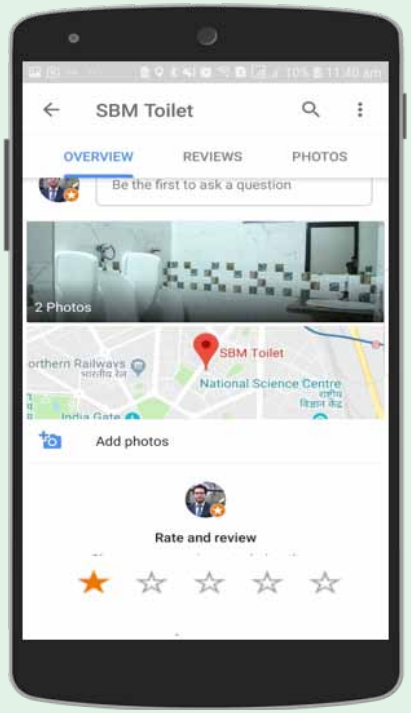
Mobile Application for Citizen Grievance Management

SBM PUBLIC TOILETS ON GOOGLE MAPS

Search, Rate and Review Toilets on Google Maps

One of the objectives of the Swachh Bharat Mission – Urban (SBM - U) is to provide sanitation coverage through the construction of Community & Public Toilet facilities across cities in India for achieving Open Defecation Free status. With majority cities already having achieved ODF status, and other cities gearing up towards the same, there was a need to move beyond monitoring and measuring outputs/targets for toilet construction to enhance actual usage, and sustainability. Ministry partnered with Google for utilizing Google maps to help users to locate public toilets and provide feedback.



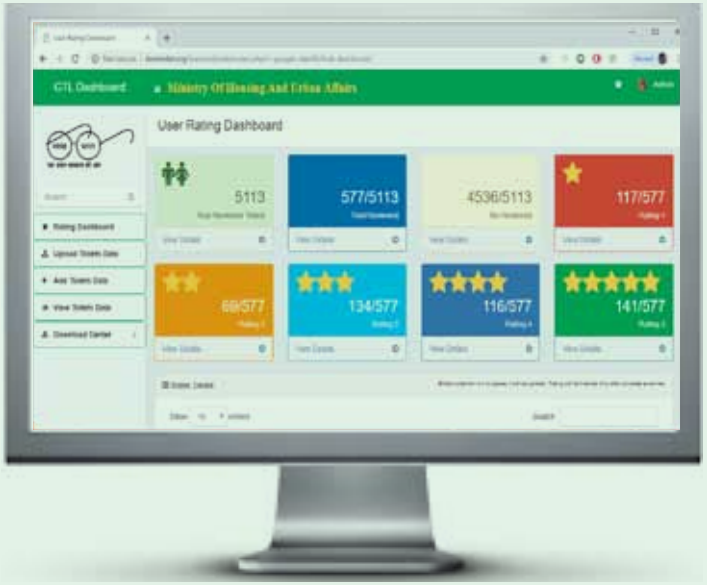


ACHIEVEMENTS TILL DATE

- Cities Live on Maps:
  - 1400
  - 85% Cities with 1 Lakh and above population
  - 80% Cities with 50,000 and above population
- Public Toilets Mapped: 42,000 blocks
- How to find on Google Maps? Search "SBM Public Toilet"

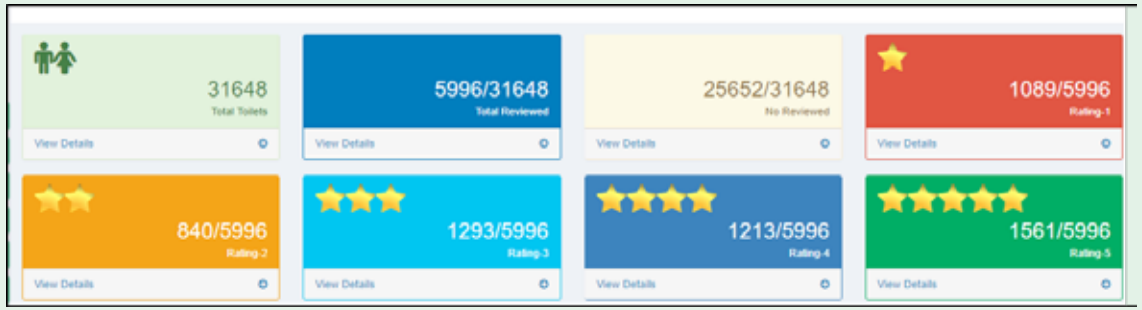
Key benefits:

- Enhanced accessibility of nearby public toilets
- Real time rating and feedback on usage of public toilets
- Additional information regarding toilet facilities available online
- Improved monitoring of public toilets by concerned authorities



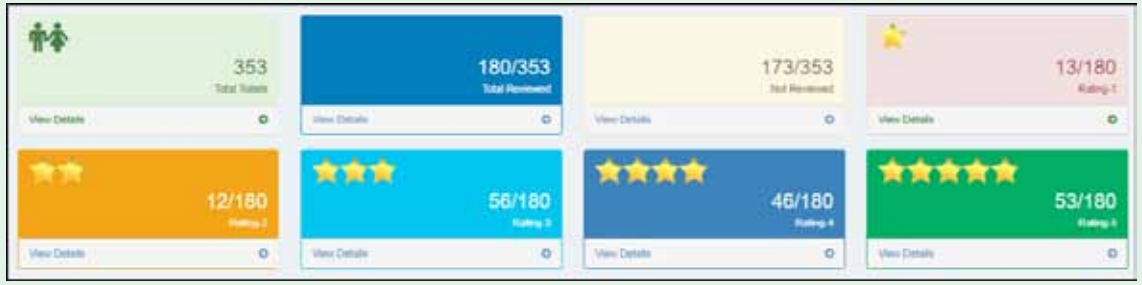
PUBLIC TOILET MONITORING DASHBOARD

National Dashboard



State Dashboard

City Dashboard



In order to increase accessibility and usage of public toilets, it was decided to map all public toilet blocks (including toilets in Hospitals, Malls, Bus Stands, Railway Stations, Metro stations, etc.) on Google Maps to ensure widest possible reach among citizens.

KEY FEATURES

- User can rate and review public toilets on Google Maps
- "No Cost Data-collection Model" devised for cities, for rapid scale up nationally
- Toilet Monitoring Dashboard: www.sbmtoilet.org
  - Details of all mapped Public Toilets and their ratings
  - Provision to submit Toilet Details for uploading on Google Maps
  - Monitoring tool for ULBs

KEY SUCCESS PARAMETERS

01 Scale Up

The no- cost model by Ministry helped in scaling up the app to 1000+ cities within 3 Months

02 Sustainable Solution

This solution allows ULBs to map all public toilets constructed under SBM and other schemes. Additionally toilets in Hospitals, Malls, Bus Stands, Railways Stations, Metro Stations, Petrol Pumps and other areas can also be mapped by the ULBs

03 Effective Toilet Monitoring

Helps ULBs to utilize the feedback given by citizens on Google Maps, and take corrective action

04 Collaboration with National Highways Authority of India (NHAI)

NHAI is also using the 'no- cost model' of Ministry to map public toilets on all National Highways

05 Additional Features

- Enables ULBs to categorize public toilets on following defined protocols: Aspirational (5 Star), Excellent (4.5 Star), Very Clean (4 Star), Clean (3 Star), Usable but dirty (2 Star), Unusable (1 Star)
- Allows User to provide feedback through SMS
- Sends SMS notification to Concerned authorities of toilets

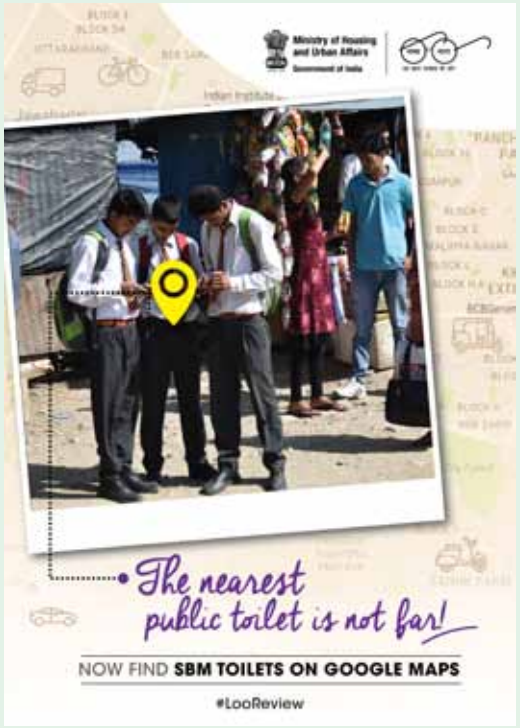
"The 'Public toilets near me' feature will benefit citizens, particularly women and senior citizens, to find easy access to clean toilets in the public space."

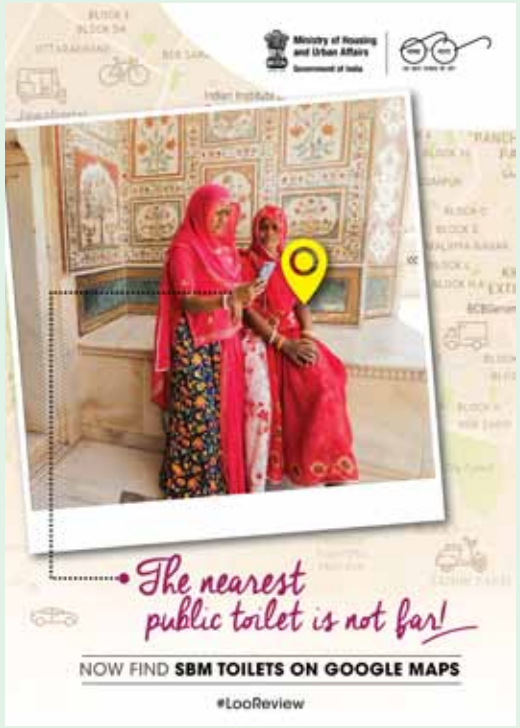
DURGA SHANKER MISHRA
Secretary, Ministry of Housing and Urban Affairs, Government of India

"Google is a committed partner in achieving the Government's vision of a Swachh Bharat. Through the #LooReview campaign, we are engaging our enthusiastic Local Guides community in India to further increase the awareness on public toilets in the country, and help citizens discover clean and well-maintained facilities in their vicinity."

CHETAN KRISHNASWAMY
Director, Public Policy, Google

MEDIA HIGHLIGHTS





Loo Review Campaign

Ministry, in partnership with Google launched a two- month Loo Review Campaign to promote the usage of Public Toilets and encourage citizens to provide feedback

CONTRIBUTIONS

- Over 32,000 reviews, photos and edits made to public toilets in India

DISCOVERABILITY

- Over 12 Million people searched for and found Public toilets on Google Maps
- 55,000 map users checked out toilet reviews

ONLINE

- Over 2,60,000 Social Media impressions

TOP 5 CITIES

Delhi | Mumbai | Kolkata | Jaipur | Hyderabad

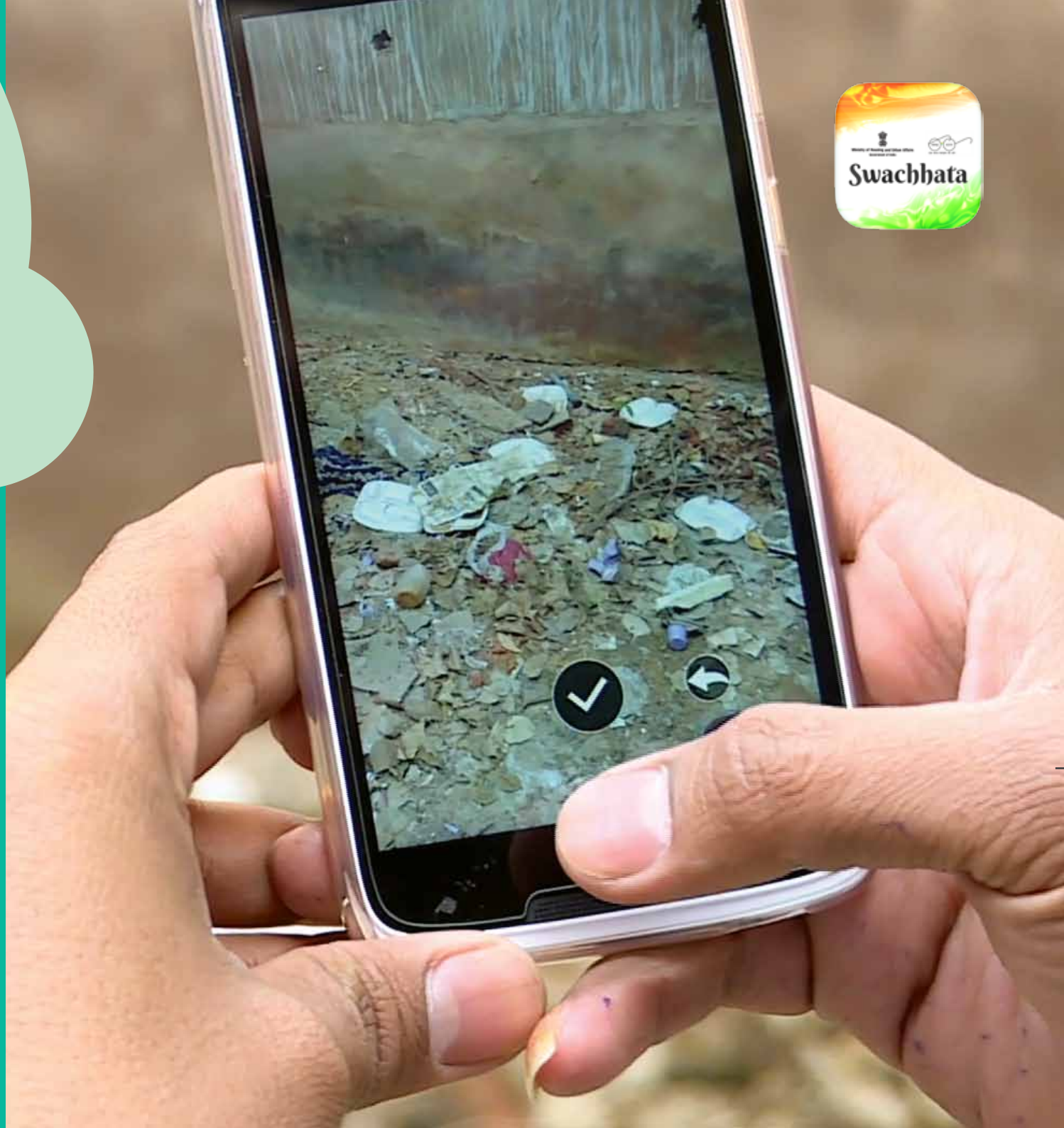
SWACHHATA MoHUA APP

Mobile application for citizen grievance management

The Swachhata Application fuses together an ICT enabled mobile based complaint redressal platform providng an opportunity for citizens to work together on Swachhata related issues. Swachhata App is allowing citizens to participate in Swachh Bharat Mission. Ministry has partnered with Janaagraha for the development, hosting and maintenance of this application.

ACHIEVEMENTS TILL DATE

- Cities Live on Swachhata App:
  4,023
- Citizens on-boarded:
  1.5 Crore
- Complaints Posted:
  1.71 Crore
- Complaints Resolved:
  1.67 Crore



"Swachhata App serves as an effective and empowering platform that enables us to resolve complaints to citizen's satisfaction as well as get feedback from the citizens."

Saumil Ranjan Chaubey, Commissioner, Bilaspur Municipal Corporation, Chhattisgarh

Mobile Application for Citizen Grievance Management

CHALLENGE:

- Difficult to report sanitation/cleanliness related issues
- Complaints reported in Municipal offices only
- Monitoring of citizen complaints
- Tracking of complaint resolutions within timeline
- No citizens feedback mechanism

SOLUTION:

- Launch of Mobile Application - Swachhata App
- Citizens can download the app easily
- Posting of complaints through mobile app
- Exclusive Engineer App for resolution of complaints
- Live tracking of complaints resolution
- Tracking of complaints resolution within SLA
- Citizens can give feedback on resolved complaints

APPLICATION USAGE

01

Swachhata MoHUA App

Citizens can upload complaints on Swachhata MoHUA App by posting a picture and selecting the location across the country

SBM Engineer App

02

Sanitary Engineer/ Inspector can see the uploaded complaints on Engineer App and accordingly take action on the ground

03

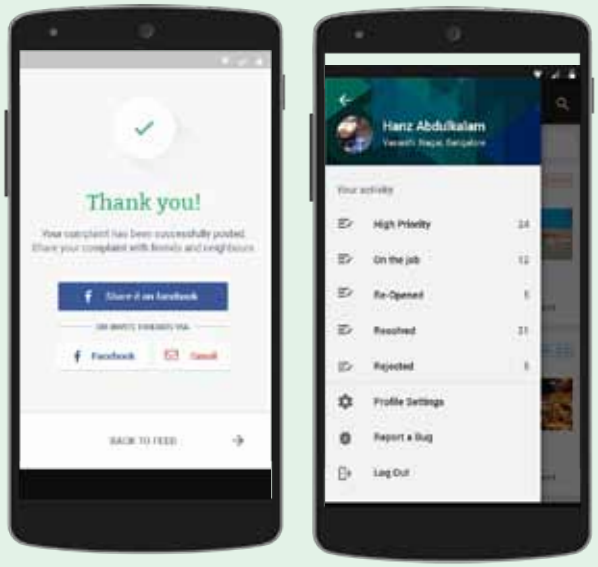
Swachh City

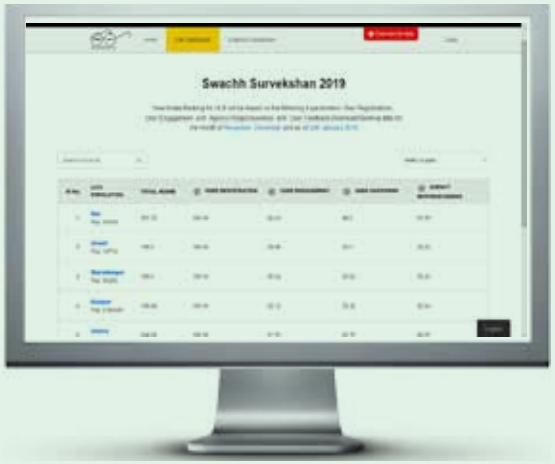
Municipal Administrators can monitor the status of the complaints of their town/city

City Dashboard

04

Citizens can see the score of cities displayed under four parameters i.e. user registration, user engagement, user happiness and agency responsiveness





MEDIA HIGHLIGHTS

सफाई अभियान चलाकर दिया स्वच्छता का संदेश

www.swachhsurvekshan2019.org पर दें फीडबैक, कड़कड़ाती ठंड में रात वो हाथों में झाड़ू लेकर निकल पड़ते हैं सफाई मित्र

आगे आएं शहरवासी और सिटीजन फीडबैक देकर इंदौर को बनाएं नंबर वन

31 जनवरी के पहले दें फीडबैक

देश-विदेश के लोग करते हैं सफाई का बखान

इंदौर तीन श्रेणी में आगे

इन सवालों के जवाब 'यस' में देना है

अपनी अहम भूमिका निभाएं

जबलपुर में एक साथ 3.5 लाख लोगों ने थामी झाड़ू, बना पहला वर्ल्ड रिकार्ड

10

750

750

city भास्कर

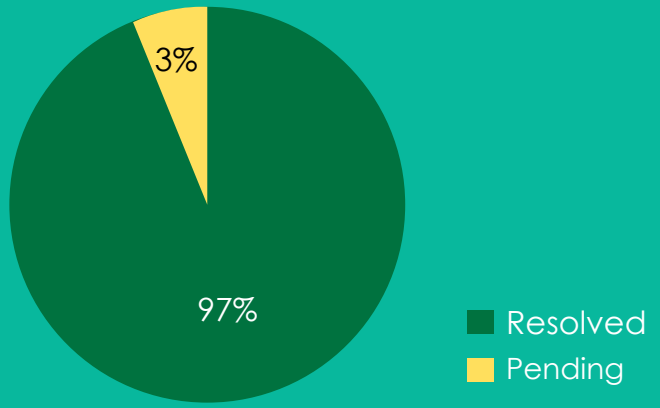
Pick-Thon Live

रिकॉर्ड के लिए संस्कारधानी ने दिखाया गजब का स्वच्छता प्रेम

KEY OUTCOMES

- 1.5 crore Citizen have registered on Swachhata App
- 1.71 crore complaints posted across the country out of which 1.67 crore complaints resolved
- The resolution rate of complaints has increased to more than 97%
- The App helped to understand citizen requirements and their participation in Swachh Bharat Mission
- Increased awareness amongst citizens about cleanliness in their surrounding

Total Complaints Resolution Status




HONDA
MAKE THE BIG MOVE
SEDAN OF THE
Call at 8010 111 111
బ్రెయిన్ స్ట్రోక్ & హార్ట్ ఎటాక్
అత్యంత ప్రాణాంతకమని
మీకు తెలుసా..?
9542 108 108
50
చెత్తను వేయుటకు
నన్ను ఉపయోగించండి

CITY LEVEL INTERVENTIONS

BENGALURU

ICT Enabled Collection and Transportation System for Solid Waste Management

VIJAYAWADA

Radio Frequency Identification (RFID)-based Waste Collection system

SURAT

ICT Enabled Real Time Monitoring of Door-to-Door Collection Vehicles

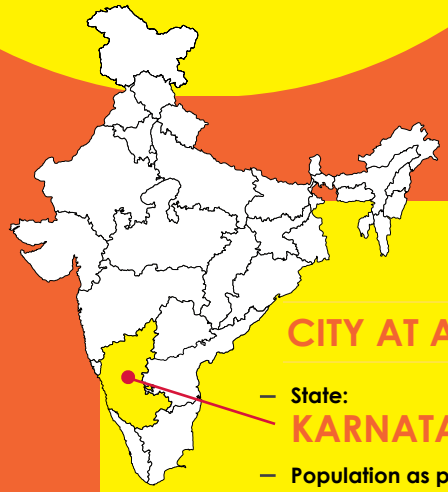
VAPI

Digital House Identification (DHI) System

BENGALURU

ICT Enabled Collection and Transportation System for Solid Waste Management

Bengaluru is situated on the Deccan Plateau at an altitude of 949 meters (3113 ft.) above sea level. With a population of over ten million, it is a megacity - the third most populous city and fifth most populous urban agglomeration in India. The city is a hub of India's high-tech industries.



CITY AT A GLANCE

- State:
  KARNATAKA
- Population as per Census 2011:
  84.43 LAKH
- Area:
  713 SQ. KM
- Number of Wards:
  198
- Number of Households:
  26 LAKH

"Radio Frequency Identification (RFID) technology intervention has helped SWM Cell, BBMP to track the attendance of the large fleet of 4000+ PCVs at mustering points and 500+ STVs at transfer locations….and has brought in better regulation and accountability into the MSW Collection and Transportation system"

Randeep D, Special Commissioner (SWM), BBMP

ICT Enabled Collection and Transportation System for Solid Waste Management

CHALLENGE:

- Large amount of waste generation in Bengaluru - 4500 Tones per day
- Collection and Transportation - 4000+ Primary Collection Vehicles (PCV) and 500+ Secondary Transportation Vehicles (STV)
- Need for monitoring and regularizing the fleet movement to the designated destinations including recording of the tonnage delivered at designated locations

SOLUTION:

- All the PCVs and STVs are installed with RFID tags
- This ensures that only authorized vehicles are allowed to enter the designated destinations, and enables stoppage of unauthorized waste transfers
- The RFID application also captures the PCVs/ STVs data at the weighbridge as an essential field to complete the scanning process
- This daily data forms the basis for calculating payments to be made to service providers based on vehicle performance

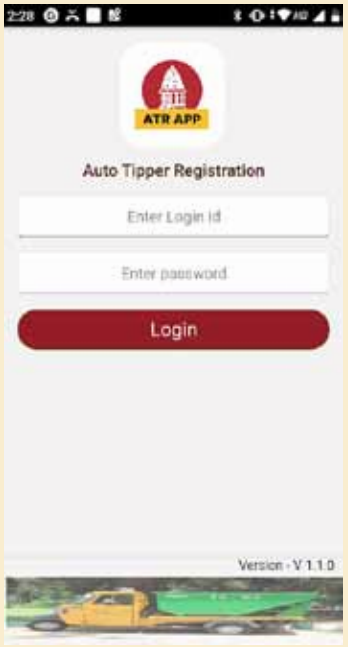
APPLICATION USAGE PCV RFID

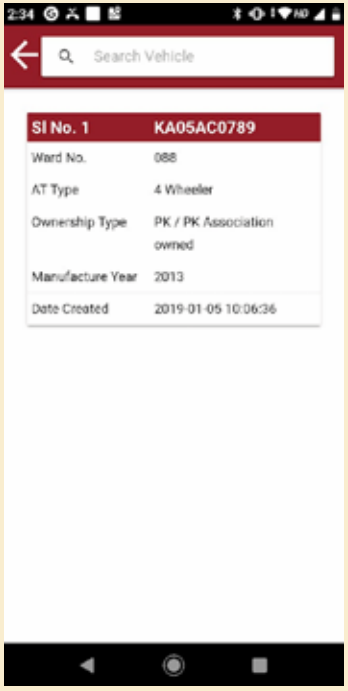
01 The details of all PCVs are uploaded on the Auto Tipper Registration (ATR) Application by the official in-charge of the Division

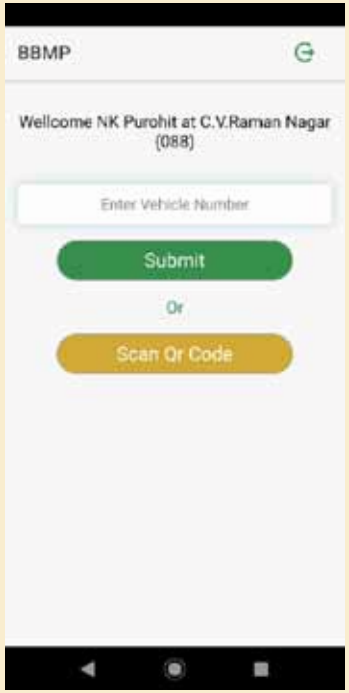
02 Each PCV is provided with an RFID tag which is fixed on the vehicle to enable easy scanning

03 The RFID of each PCV is scanned at mustering point and at first and second transfer points to the STVs

04 This enables monitoring of the PCVs attendance, completion of the allocated number of trips for the day and transfer of waste to the allocated STVs







APPLICATION USAGE STV RFID

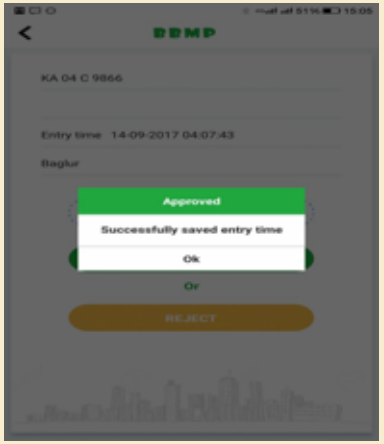
01 The application for scanning is installed by the authorised personnel through authentication and approval process

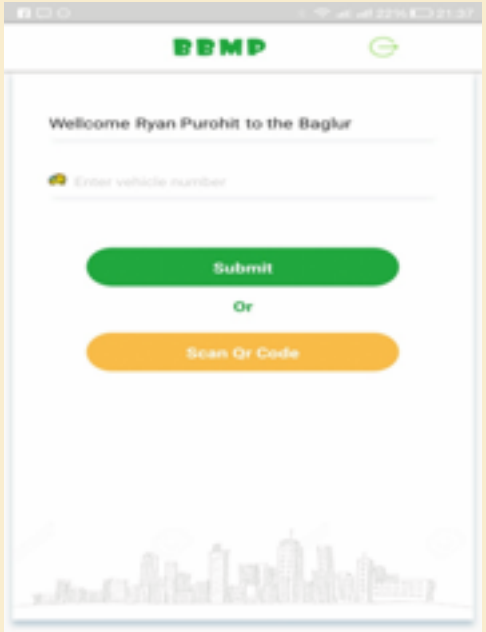
02 Each vehicle has been provided with RFID tags which are required to be read at the entrance of processing plants or sanitary landfill

03 The vehicles are provided access only on authorization through RFID scanning. The data is compiled and provided to SWM Cell on a daily basis

04 The daily data captures number of vehicles reaching designated locations, and overall performance of each vehicle at the end of the month

05 Integration of RFID monitoring with centralized smart control room and block-chain based citizen grievance helpline





"RFID based monitoring of vehicles by BBMP has ensured that tax payers' money is used for paying the service providers, based on actual collection service provided"

Manjula Rao, Ward number – 154, Bengaluru

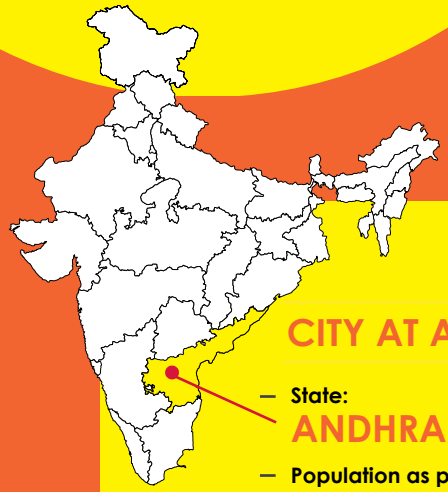
KEY OUTCOMES

- Movement of each vehicle is monitored
- 100% vehicles reach designated destinations
- No scope for manual interventions in the vehicle performance measurement
- Eliminated scope for data manipulation, making the data reliable and authentic
- Enables analysis of vehicle arrivals against the allocated numbers and subsequent input into the processing plants and sanitary landfill
- Helps in planning for manpower and vehicle optimization at the ward level based on the number of trips made and tonnage carried
- Integration of RFID monitoring with centralized Smart Control Room and blockchain based citizen grievance helpline ensure seamless service delivery

VIJAYAWADA

Radio Frequency Identification (RFID) - based Waste Collection system

Vijayawada is a city in Andhra Pradesh spread over an area of 61.88 sq kms with population of 10.48 lakhs (as per 2011 census), on the banks of River Krishna in Krishna district. It is the second largest city in Andhra Pradesh by population. Vijayawada is an ISO 37120 Platinum Level certified city.



CITY AT A GLANCE

- State:
  ANDHRA PRADESH
- Population as per Census 2011:
  10.48 LAKH
- Area:
  61.88 SQ. KM
- Number of Wards:
  77
- Number of Households:
  3.4 LAKH

"The implementation of RFID based Bin Management system helped us to ensure that the lifting and cleaning of garbage bins takes place on time."

J NIVAS, Commissioner, Vijayawada Municipal Corporation

IoT based RFID Bin Management System and use of ICT in waste management practices

CHALLENGE:

- Waste generation in Vijayawada city is 550 metric tonnes/day
- Monitoring collection of 100 % garbage from Garbage Bins

SOLUTION:

- All the SWM Bins are installed with RFID tags
- Tags are automatically read by the RFID Readers
- Records the shift-wise lifting of the SWM Bins
- Movement of the vehicle is monitored via GPS system
- Real time data is recorded and transferred to Central Command Center

APPLICATION USAGE

01 Start to end monitoring of the entire process of waste pick up and transfer from SWM BINS to processing site through a structured process using IOT Technology devices

02 RFID tags are installed at the top of each garbage bin. Each tag has unique details of the SWM bins (Bin number, location, assigned truck details etc.)

03 Once the truck reaches the location to pick up waste from the SWM bin, the driver reads the RFID tag on the SWM bin through the RFID reader. Information is sent to the server with the details of the specific SWM bin and the time of lifting is recorded

04 The movement of the vehicle is tracked through the vehicle tracking devices. Real Time data is sent to the server for online monitoring

05 Low maintenance Sim based Solar CCTV Cameras have been installed city wide to monitor spillage of secondary garbage bins

"We are amazed to see that SWM Bins and Collection Vehicles are fully equipped with RFID Tags and GPS devices, and management of the SWM Bins is very reliable."

R Aruna Kumari, Ward number – 8, Vijayawada

KEY OUTCOMES

- Garbage bin monitoring, and lifting of garbage with accuracy
- Monitoring of vehicle movement through GPS system
- Littering is controlled through regular lifting of garbage bins
- IoT based unique RFID Bin Management system has reduced the day-to-day operation cost
- Saves time and manpower
- Timely lifting of garbage bins is monitored at control center continuously
- Complaints related to the garbage lifting has reduced

SURAT

ICT Enabled Real Time Monitoring of Door-to-Door Collection Vehicles

- 8th most populous city in India
- Economic Capital of Gujarat
- 90% diamonds in the world are cut and polished here
- 40% of nations total man-made fabric & 28% of nation's total man-made fibre are produced in Surat

CITY AT A GLANCE

- State:
  GUJARAT
- Population as per Census 2011:
  44.67 LAKH
- Area:
  326.515 SQ. KM
- Number of Wards:
  34
- Number of Households:
  14.11 LAKH

"Surat Municipal Corporation has been able to effectively track door-to-door waste collection to ensure effective waste collection in city"

M Thennarasan, Commissioner, Surat Municipal Corporation

ICT Enabled Real Time Monitoring of Door-to-Door Collection Vehicles

CHALLENGE:

- Difficulty in ensuring that the vehicle attends the routes/societies at the specified time
- Difficulty in performance measurement of the vehicle/contractor, penalty and payment calculation
- Difficulty in monitoring timely pickup of containers
- Manual process for calculation of SLA, penalties and payments
- Non-availability of on-demand reports of vehicles, total garbage collected etc.

SOLUTION:

Real time monitoring of vehicles

- Availability of real-time information of waste collection activity
- Automation of transfer stations and disposal site for daily movement of garbage
- Use of technology to minimize human intervention and to improve the collection efficiency

APPLICATION USAGE

01

Radio Frequency Identification (RFID) Tag is installed on all door-to-door vehicles. This automatically identifies the vehicles at transfer stations and records their weight automatically

02

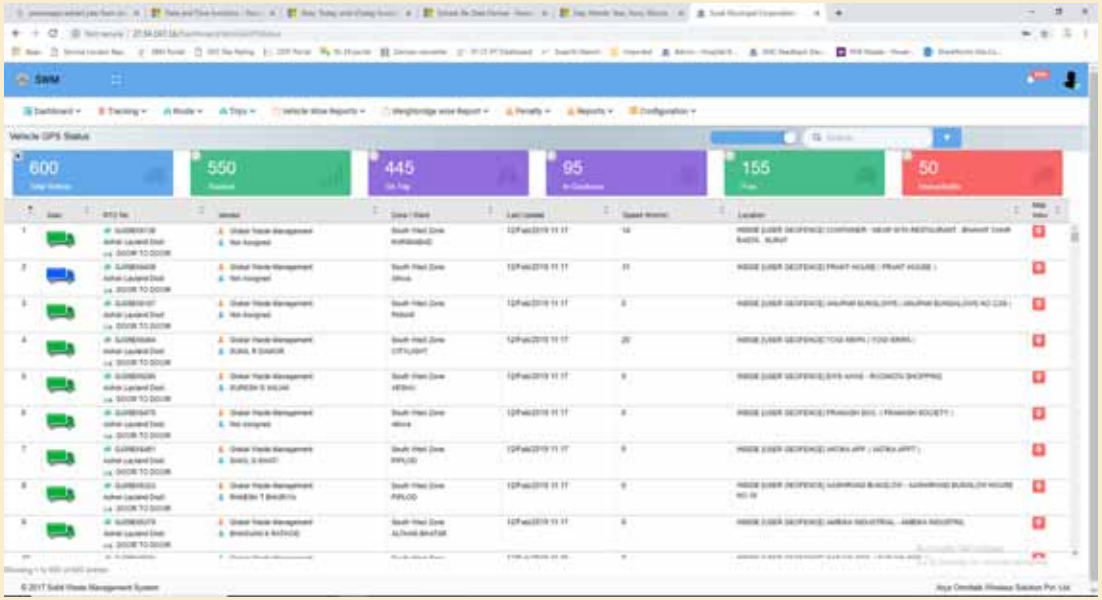
551 vehicles are tracked using this system. GPS provides real time location of all the vehicles. It also informs whether door-to-door vehicles have captured all the Point of Interests (POIs) along the routes assigned to each vehicle

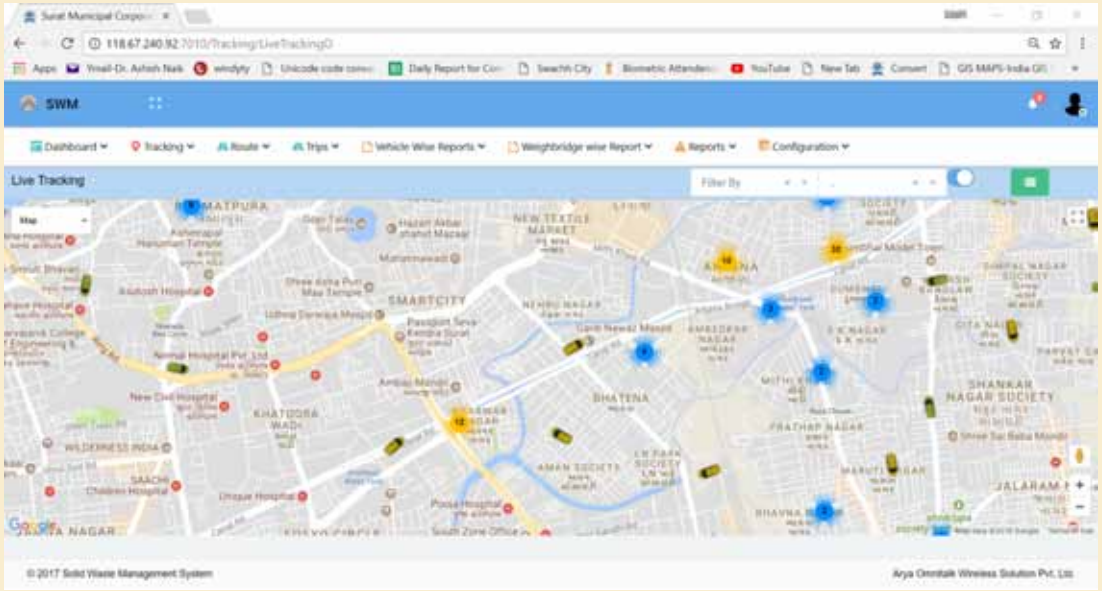
03

Door-to-Door waste collection contractors can be penalized according to the routes and POIs not covered. GPS also provides real time monitoring of all door-to-door vehicles at command and control center for Surat Municipal Corporation

04

Vehicle identity can be linked with the weight recorded automatically at weigh bridge across all transfer stations





"The waste collection vehicles are coming regularly and we do not have to keep the garbage in our house or surroundings for long time"

Dr. Jasma Patel, Ward number – 1, Surat

KEY OUTCOMES

- Minimum human intervention
- Accurate and real time monitoring of each vehicle
- Real time grievance redressal of complaint
- Real time data of each vehicle at all waste handling facilities
- Accountable and transparent waste collection system
- Prevention of misuse of any manual intervention in the system
- Ensures complete coverage of waste collection across Surat city
- Helps monitor the performance and SLA for waste management services
- Real-time data analysis and decision making

VAPI

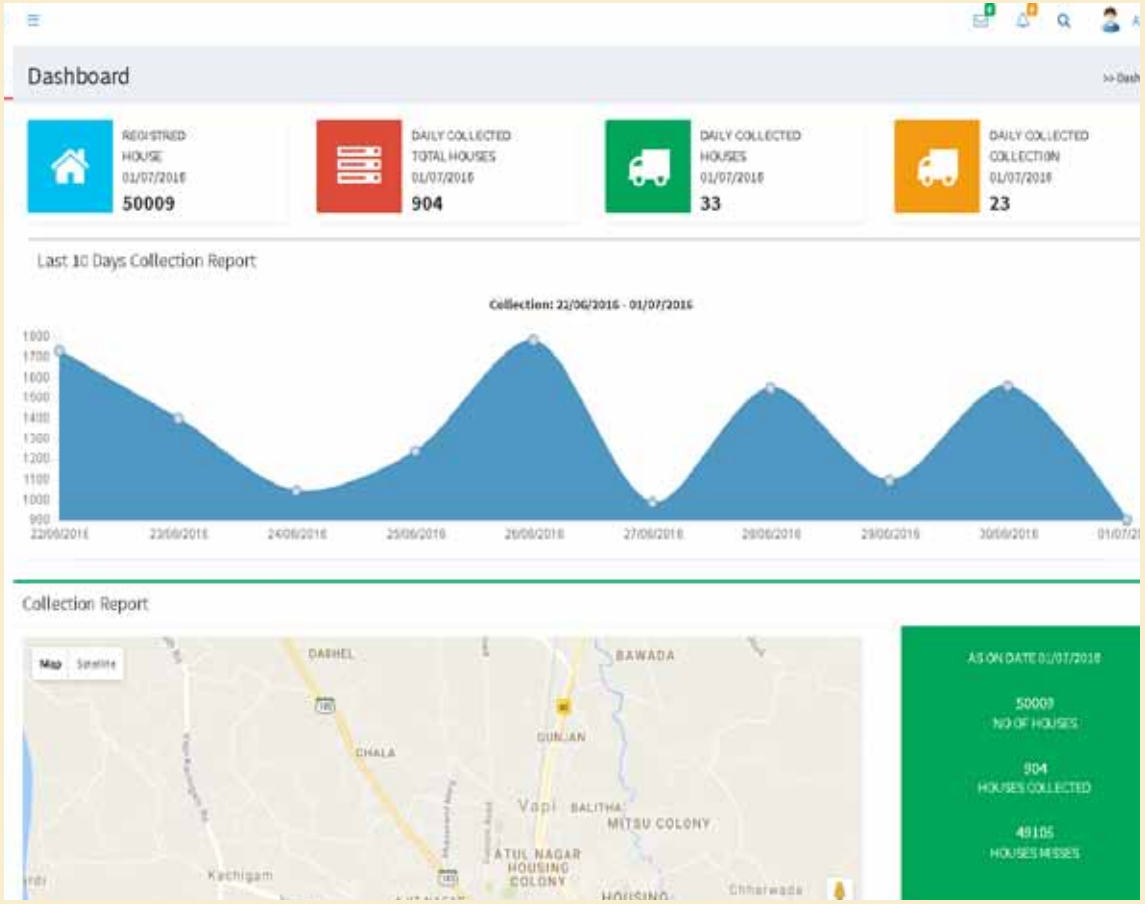
Digital House Identification (DHI) System

Vapi, is a municipality in Valsad District in the state of Gujarat. It is situated near the banks of the Damanganga. It is surrounded by the Union Territories of Daman to the west and Dadra and Nagar Haveli to the east. It is an Industrial town with more than 3000 small and medium industries.

CITY AT A GLANCE

- State: **GUJARAT**
- Population as per Census 2011: **1.63 LAKH**
- Area: **22.44 SQ. KM**
- Number of Wards: **14**
- Number of Households: **72,000**

Locate **Validate** **Engage**



"By implementing DHI, door-to-door waste collection tracking and monitoring has become easier. This has made municipal governance more accountable, transparent and citizen friendly."

Darpan D Oza, CO, Vapi Municipal Corporation

Digital House Identification (DHI) System

CHALLENGE:

- Difficulty in finding addresses due to lack of unique house IDs
- Complaints for door-to-door garbage collection was piling
- Lack of public participation and ownership
- Lack of method for citizens grievance redressal

SOLUTION:

- A digital code (easycity code) is given to every house along with Near Field Communication (NFC) tag
- Enables the Municipal Corporation to integrate all government services with individual houses
- NFC tag validate all visits of door-to-door garbage collection
- Helps ULB and citizens to locate houses on map and share it digitally

APPLICATION USAGE

01

Tracking of door-To-door garbage Collection

with location based attendance using NFC tags outside all properties

Complaint Management

02

Smartphone enabled complaint management helps resolve citizens grievances effectively

03

Citizens Connect

SMS & Phone call alerts are sent to citizens

Smart Address

04

Easycity code is an open smart address platform which can be used by citizens . It has a unique code which is easy to find and share

"I get all important information from Nagarpalika through SMS now. My complaints got solved very fast and I also received a feedback call from the official. "

Dilip Luhar, Ward number – 9, Vapi

KEY OUTCOMES

- **90 % reduction in door-to-door Waste collection complaints**
- **10x increase in number of citizens grievance solved in a day**
- **Savings of 20+ lakh for waste department**
- **Average time to solve a complaint down from 10 days to less than 2 days**
- **Digital House Identification system has increased transparency, accountability and efficiency of Vapi Municipal Corporation**
- **Data oriented reports and analytics help the city in better and effective decision making**


नगर निगम
इन्दौर
जोन क्र. 11
वार्ड क्र. 48

CITY LEVEL INTERVENTIONS

BHOPAL

Internet-of-Things (IoT) based fill-sensor devices in garbage bins

INDORE

Internet-of-Things (IoT) based automated manless weighbridges

NAVI MUMBAI

ICT enabled Public Toilet Feedback System

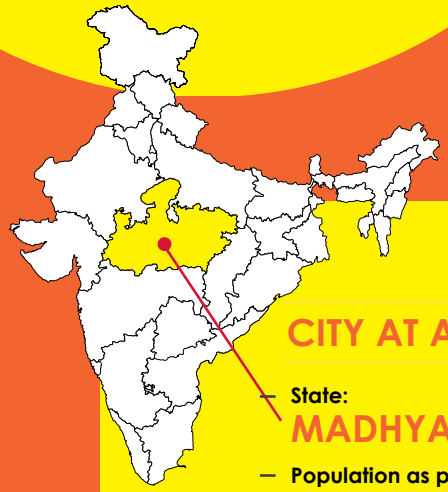
NEW DELHI

Swachh ATM - Automated machine to collect waste PET bottles

BHOPAL

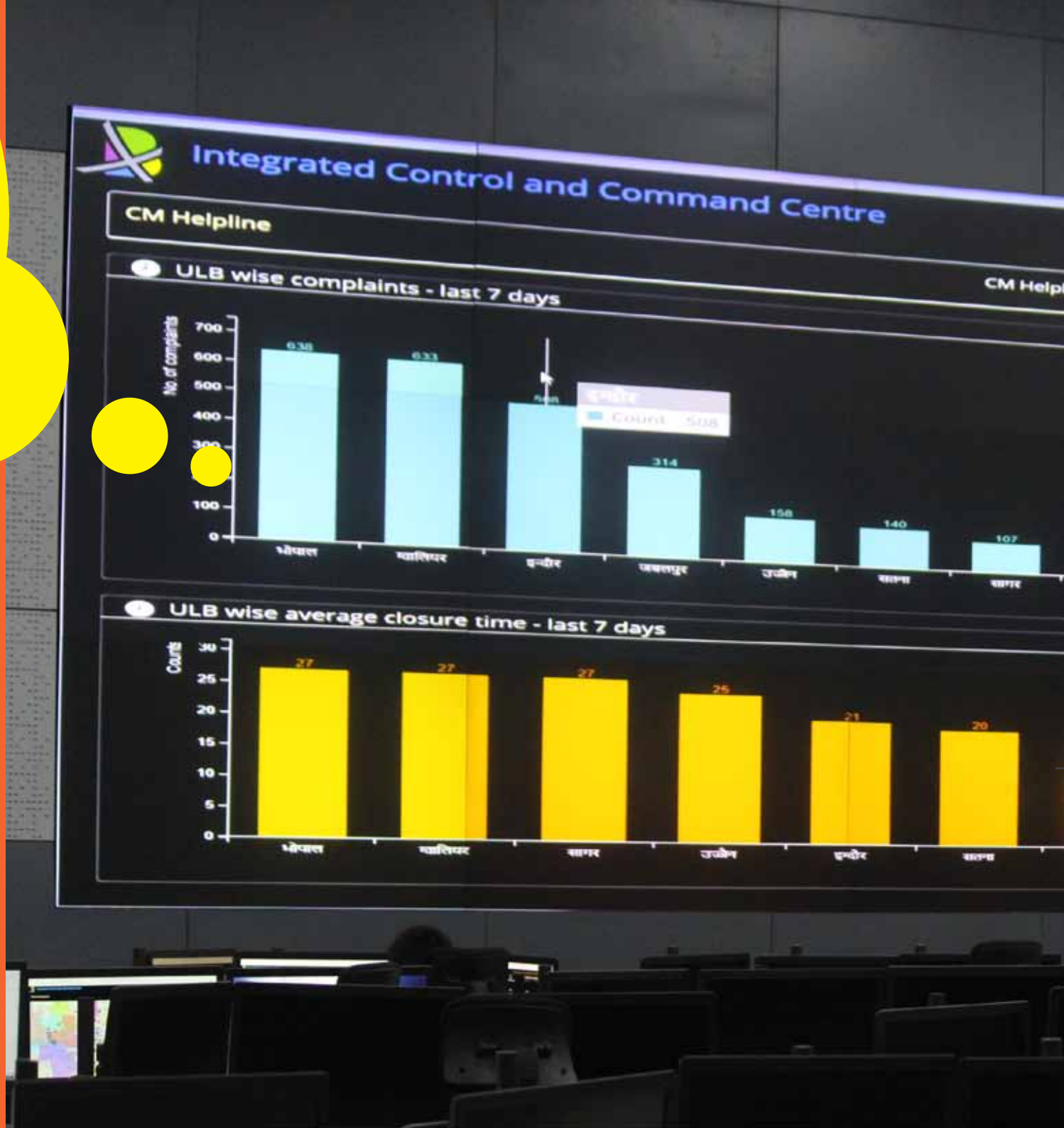
Internet-of-Things (IoT) based fill-sensor devices in garbage bins

Bhopal is the capital city of the Indian state of Madhya Pradesh. Bhopal is known as the City of Lakes for its various natural as well as artificial lakes and is also one of the greenest cities in India. It is the 17th largest city in the country.



CITY AT A GLANCE

- State:
  MADHYA PRADESH
- Population as per Census 2011:
  17.98 LAKH
- Area:
  285.9 SQ. KM
- Number of Wards:
  56
- Number of Households:
  3.6 LAKH



Internet-of-Things (IoT) based fill-sensor devices in garbage bins

CHALLENGE:

- Littering due to overflowing waste bins.
- Waste Bins placed across wide-spread geography.
- Bins in high traffic areas becoming full quickly.
- Aligning garbage collection trips with the fill status of the garbage bins was not possible and hence high number of trips, overhead costs, and little (or) no planning over garbage collection processes.

SOLUTION:

- Installed 700 RFID and fuel sensors in SWM Vehicles and 230 IOT sensors covering 460 twin-bins covering the high priority zones/wards as identified by BMC.
- Real time monitoring, as these IOT sensors were integrated with Real Time Vehicle Tracking System (RTVTS) of Bhopal Municipal Corporation.
- Integration aided in route planning & optimization for waste collection.
- High weekly collection frequency.

APPLICATION USAGE

01

IOT based ultrasonic fill-sensor devices were installed across the twin-bins in the identified zones/ wards by BMC

02

The fill-level sensors identify the fill status of the bins and start triggering alerts to Central Command Centre and respective ward officers upon 80 % fill capacity

03

Accordingly vehicle en-route is identified and SMS is triggered from RTVTS system to collect the identified garbage bin

04

This integration enables –

- Route planning & Route optimization
- Effective ward-wise mapping of vehicles, planning of routes, and improved monitoring at ground level

The new system has helped BMC financially by reducing the running cost, fuel costs and maintenance cost and also helped in checking the unauthorized use of municipal vehicles.

B Vijay Dutta, Commissioner, Bhopal Municipal Corporation

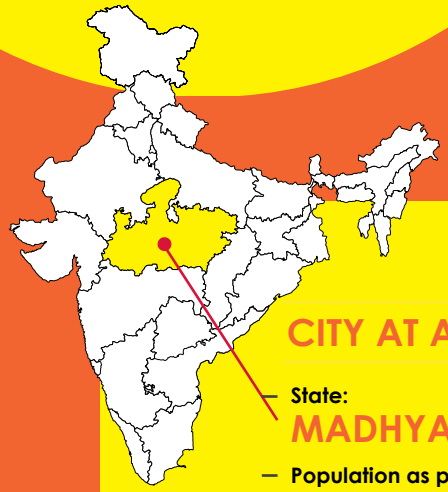
KEY OUTCOMES

- Automated Garbage Collection
- Real-time analytics as the system generate reports and provides a comparison with past behavior
- Integration with Command & Control Center
- Better monitoring and aids in effective decision making for city planners & administrators
- Cutting down number of unwarranted trips
- Real-time alerts at Command & Control Center for garbage clearing
- Flexible trip scheduling and route optimization
- Helps understand underlying pattern of garbage collection and collection frequency
- Integrated system enables for complete control right from assigning vehicle to collection & dumping

INDORE

Internet-of-Things (IoT) based automated manless weighbridges

Indore is the largest city of Madhya Pradesh by population. Indore has been described as the commercial capital of Madhya Pradesh. Indore has been declared as the Cleanest City in India for two consecutive years in 2017 and 2018.



CITY AT A GLANCE

- State:
  MADHYA PRADESH
- Population as per Census 2011:
  19.94 LAKH
- Area:
  390 SQ. KM
- Number of Wards:
  85
- Number of Households:
  4.82 LAKH

"Accurate weighing to know the quantity of wet and dry waste separately is the backbone of SWM. Automated man less weighbridges with RFID readers, automated boom barriers have been installed at all 10 transfer stations for temper proof system "

Asheesh Singh, Commissioner, Indore Municipal Corporation

Internet-of-Things (IoT) based automated manless weighbridges

CHALLENGE:

- Large amount of waste generation in Indore - 1100 tonnes per day
- Impossible to assess the weight of wet and dry waste separately
- Difficult to know whether 100% waste is lifted and processed
- Manipulation in weight and vehicle trips
- Real time trips and location of the vehicles not captured

SOLUTION:

- Door-to-door collection vehicles are GPS installed with RFID
- Tags are automatically read at the automated boom barriers
- Records the trip of all the vehicles
- Stops unauthorized vehicles entering the transfer stations
- Real time data is recorded and transferred to central command center

APPLICATION USAGE

01

All the vehicles are installed with GPS and are RFID tagged. When these vehicles reach the weigh bridge, the automated boom barrier reads the RFID tag and opens.

02

- Vehicle is weighed at the 1st weighbridge
- Unloads the dry waste and weighed at the 2nd weigh bridge
- Unloads the wet waste and weighed at the 3rd weigh bridge

03

The complete data is automatically compiled and transferred to the Central Command Centre

04

Data of daily dry and wet waste collected and transported by each vehicle from various wards and to processing facility is recorded.

"We are able to locate our waste collection vehicle real time on the app. "

Santi Sharma, Ward number - 71, Indore

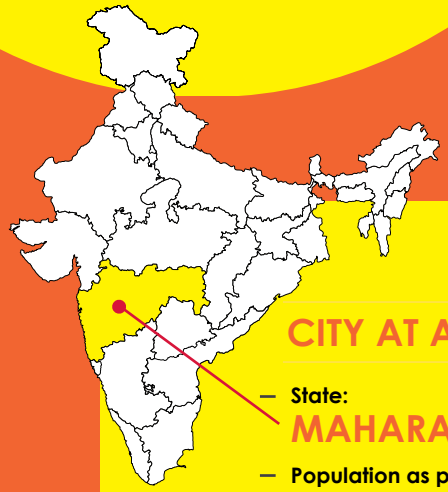
KEY OUTCOMES

- Accurate weighing of wet and dry waste at every transfer station and processing facility
- Automatic management of transfer station and processing facility
- Waste is collected and transported daily
- No manipulation or tampering with data
- Reduced day to day operation cost
- Saves time and manpower
- Check on the unauthorized vehicles dumping the waste at transfer stations
- Accurate data to be used for various future planning purposes
- Data analytics shows the change in waste generation
- Processing and production capacity is well managed because of accuracy of data

NAVI MUMBAI MUNICIPAL CORPORATION

ICT enabled Public Toilet Feedback System

Navi Mumbai is a counter magnet of the Mumbai Metro City. Under Swachh Survekshan 2018, the city has been ranked 8th among 434 cities surveyed for cleanliness and hygiene. The city is governed and maintained by Navi Mumbai Municipal Corporation and constitutes of – Belapur, Nerul. Vashi, Turbhe, Koparkhairane, Ghansoli, Airoli and Digha.



CITY AT A GLANCE

- State:
  MAHARASHTRA
- Population as per Census 2011:
  11.20 LAKH
- Area:
  109.59 SQ. KM
- Number of Wards:
  89
- Number of Households:
  2.48 LAKH

ICT enabled Public Toilet Feedback System

CHALLENGE:

- No real time data about the status of public toilets was available
- Poor maintenance of public toilets
- Only when a citizen makes a complaint through Swachhata App or NMMC e-Connect, the corporation would come to know about the condition of the toilets

SOLUTION:

- Toilet feedback through free SMS
- NMMC used the CDAC Pull SMS package where CDAC provided a gateway through toll free number
- Citizens can now swiftly give feedback about the cleanliness and hygiene standards of the toilets
- NMMC installed ICT based wall mounted devices in 12 of its public toilets on pilot basis

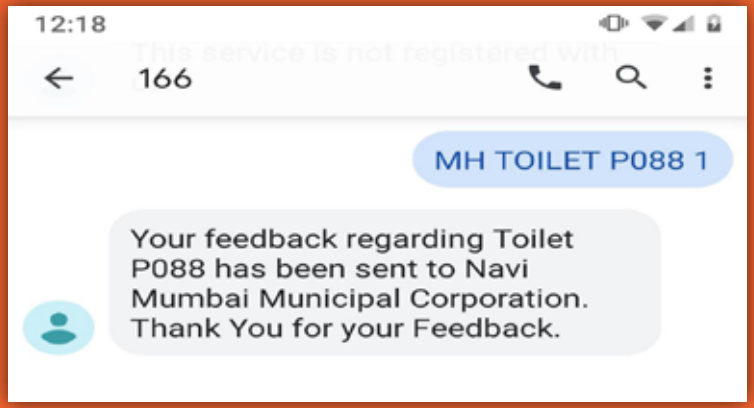
APPLICATION USAGE

01

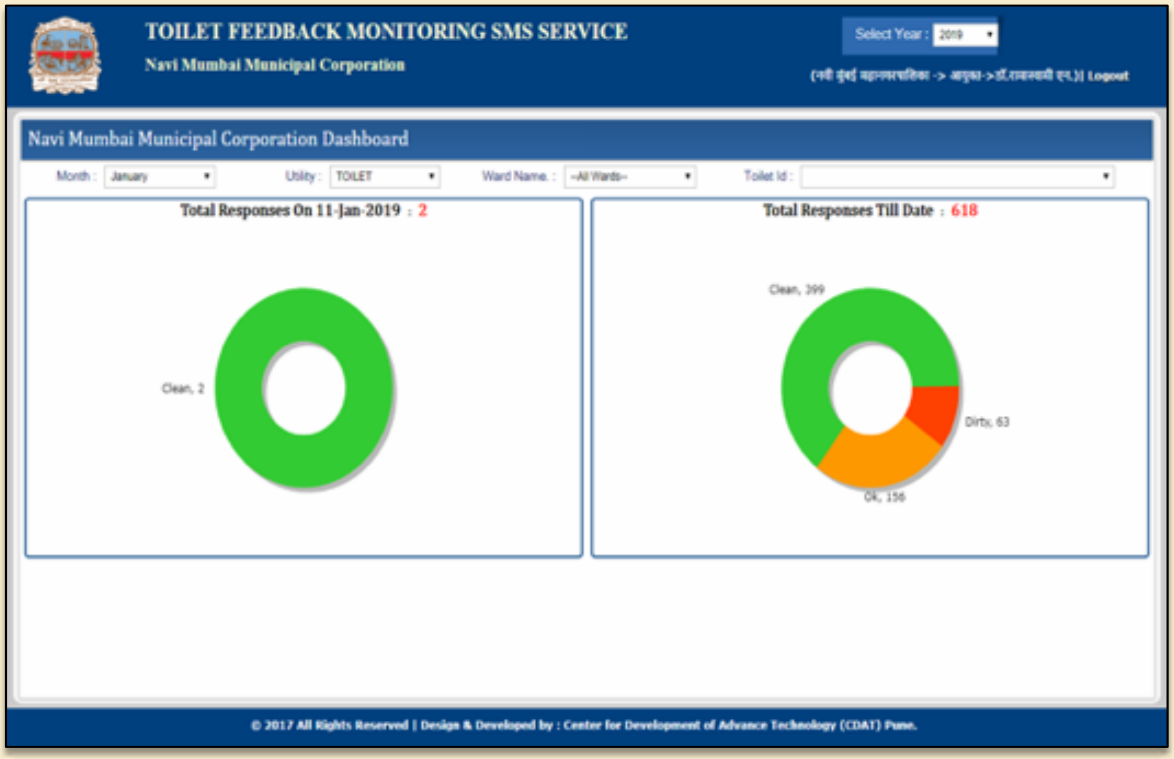
- Every toilet was given a unique ID – an alpha numeric number
- Stickers mentioning Toilet ID and 'how to provide feedback' were placed in all toilets
- Citizens can rate their experience as Clean (1), Ok (2) and Dirty (3)

02

SMS needs to be typed in the below format.
MH<space>TOILET<space>TOILET ID<space> FEEDBACK CODE.
Example: MH TOILET P088 1



NMMC has more than 73% user satisfaction reported from the feedback mechanisms. The real time dashboard of the application is shown below:



"Toilet feedback arrangement given by the Corporation is very easy to use. It is also a convenient tool for monitoring toilet cleanliness and improving service by the Corporation……."

Kachru Kisan More, Nerul Ward, Navi Mumbai

KEY OUTCOMES

- Serves as a management tool to conduct monthly trend analysis, analyze performance and identify service performance gaps
- Real time monitoring helps NMMC to take measures proactively
- When a particular toilet feedback is consistently voted as OK or Dirty, NMMC takes immediate action to initiate physical inspection of the location and subsequently corrective measures are implemented to ensure better services and improved citizen satisfaction
- Citizen's participation increases if the service delivery methods are simplified and standardized

NEW DELHI
MUNICIPAL COUNCIL

Swachh ATM - Automated machine to collect waste PET bottles

The administrative district of National Capital Region, New Delhi Municipal Council (NDMC) has been adjudged as the cleanest city in 1-3 lakh population category in Swachh Survekshan 2018

CITY AT A GLANCE

- State:
  NEW DELHI
- Population as per Census 2011:
  2.54 LAKH
- Area:
  42.74 SQ. KM
- Number of Wards:
  19
- Number of Households:
  48,000

"These machines are the latest innovative technology in which disposing of plastic bottles is clubbed with incentivized coupons/ cash to bring about behavioral change in citizens."

Naresh Kumar, Chairman, NDMC

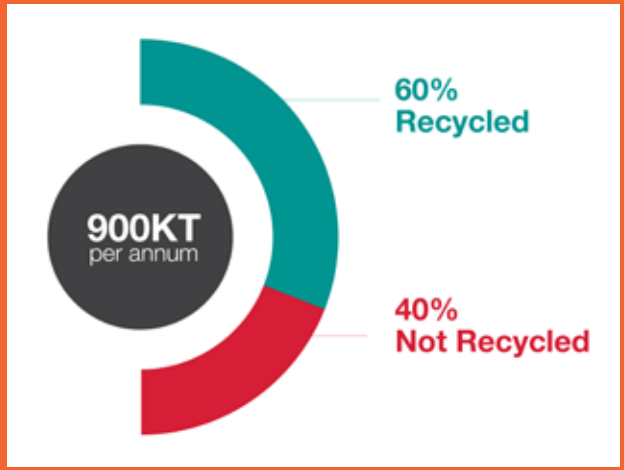
Swachh ATM - Automated machine to collect waste PET bottles

CHALLENGE:

- Increasing number of waste PET bottles
- No proper channel of collection of waste PET bottles
- PET bottles getting mixed with other garbage and requires extra cost for segregation
- Huge volume blocking the city drains

SOLUTION:

- Installation of automated reverse vending machine to collect waste PET bottles
- Automated waste collection and segregation
- Instantly rewards user with coupons for cleanliness effort



01

Dispose of your bottles by pressing the start button on the touch screen

User chooses the rewards from the various reward options on the machine and redeems it

02

03

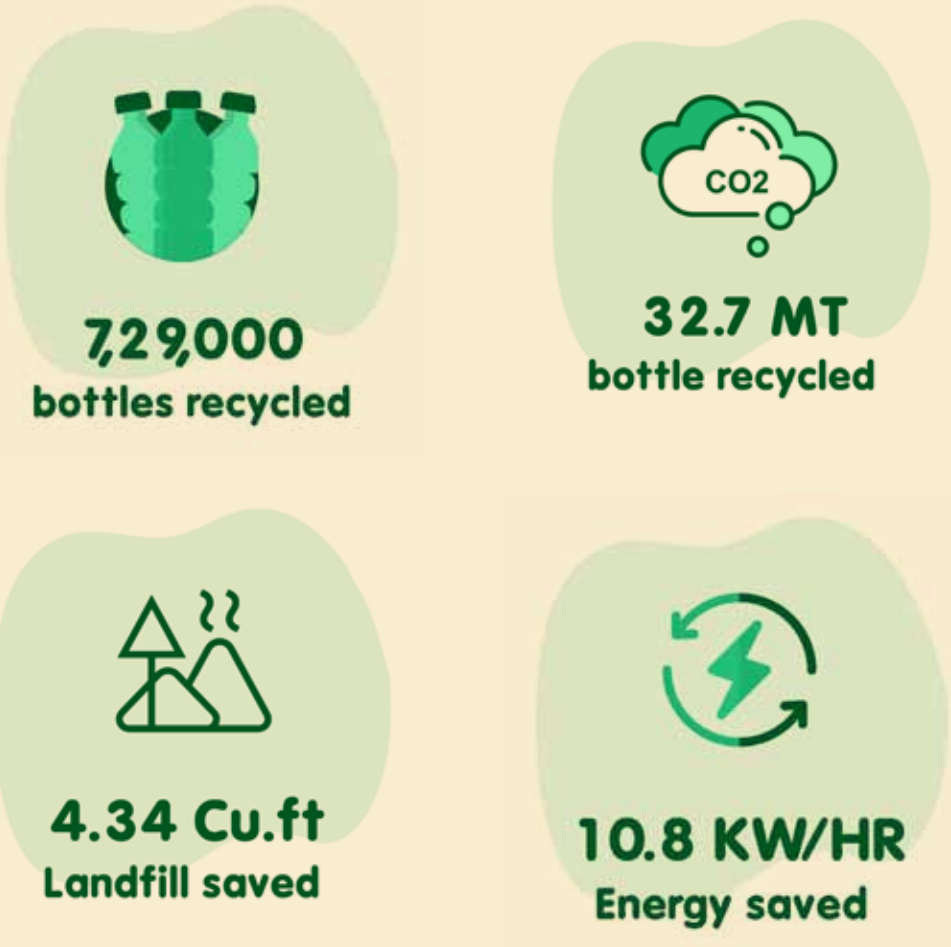
- Easy to install
- Plug & Play- Requires only Electricity and Wifi

- Replicable Model
- Highly Recommended for tourists & commercial spaces

04

APPLICATION USAGE

JOURNEY OF COLLECTED PET BOTTLES

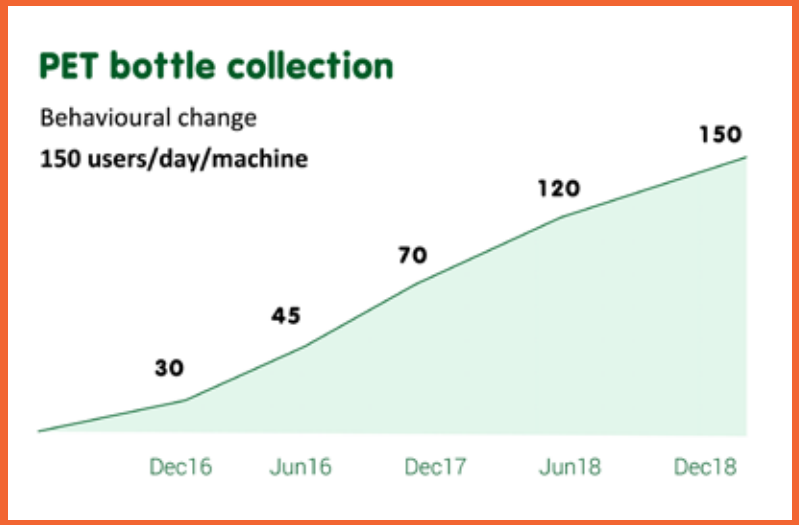


"I was amazed to see that PET bottles can give you rewards. It is one such initiative that could unite the whole country to promote recycling."

Vikas Sharma, Burari, New Delhi

KEY OUTCOMES

- Consumer Awareness
- Increased Efficiency of Disposal
- Quality of Recycling gets improved
- Behavioral change among people due to Incentivisation Model
- Environmental Sustainability



NOTES

NOTES

NOTES

स्वच्छ भारत

एक कदम स्वच्छता की ओर

SWACHHATA PLEDGE

Mahatma Gandhi dreamt of an India which was
not only free but also clean and developed.

Mahatma Gandhi secured freedom for Mother India.

Now it is our duty to serve Mother India by keeping the country neat and clean.

I take this pledge that I will remain committed towards cleanliness and devote time for this.

I will devote 100 hours per year that is two hours
per week to voluntary work for cleanliness. I will neither litter nor let others litter.

I will initiate the quest for cleanliness with myself, my family, my locality,
my village and my work place.

I believe that the countries of the world that appear
clean are so because their citizens don't indulge in littering nor do they allow it to happen.

With this firm belief, I will propagate the message of Swachh Bharat Mission in villages and towns.

I will encourage 100 other persons to take this pledge which I am taking today.

I will endeavour to make them devote their 100 hours for cleanliness.

I am confident that every step I take towards cleanliness will help in making my country clean.

Ministry of Housing and Urban Affairs
Government of India