

Research Paper Topic:

Impact of NGO, third Parties and Organised campaigns on Waste Segregation & Management

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Table of Contents

1. Introduction	3
2. Keywords	4
3. Objectives	4
4. Literature Review	4
5. Research Gap	14
6. Methodology	14
7. Results	15
8. Data Analysis & Interpretation	23
9. Conclusion	31
10. Limitation	31
11. Managerial Implications	31
12. Data Availability	32
13. Disclosure	32
14. Conflicts of Interest	32
15. Author's Contribution	32
16. Acknowledgement	32
17. References	33

1. INTRODUCTION

The amount of solid waste delivered in city relies upon the kind of the city, its populace, expectations for everyday comforts of the inhabitants and level of commercialisation and different exercises winning in the city. The age of waste primarily relies upon the expansion in populace and the kind of action. Inappropriate Municipal Solid Waste Management (MSWM) causes different wellbeing perils and prompts natural corruption. The current paper features the current situation of the Municipal Solid Waste Management in Pune City while comparing previously existing data from similar condition secondary data from Manipur and even African slums.

The examination included both Primary & Secondary information. Investigation of the actual waste produced helps in the better administration of the waste. The actual portrayal of the existing waste management system like collection system practiced, along with the storage, transportation and disposal systems used were studied.

In the secondary data analysis, it was revealed that organic waste was the most noteworthy in all the three region for example 60.59%, 60.08% and 57.71% for Imphal, Thoubal and Bishnupur individually and followed by plastics and paper and least was cowhide. (Raghumani, 2015) Though this data was taken from Manipur region on cross sectional characterisation basis this data is used for auxiliary data considerations to minimise the effect of extraneous and exogenous variables.

The current paper attempts to break down the situation of the management of Waste in the Hadapsar slum area of Pune, and the job NGOs play in their productive administration. In areas with absence of 3rd party initiators like NGO's and NPO's the solid waste management practices such as storage and disposal practices in the slums were unsatisfactory, and separation and composting were minimally practiced. (nitin, 2014). Mr. Nitin conducted research in the whole of Pune district and conducted an evaluation of the complete process of solid waste management including collection, storage, segregation, transportation, treatment and disposal using Geospatial tools.

"The habits, worries, and attitudes of slum people demonstrated a lack of appropriate understanding about good waste practises, their duties, and the repercussions of bad waste management," he stated. Residents of the slums, on the other hand, were eager to participate in garbage sorting and composting. As a result, responsible authorities must work with residents of urban slums to enhance solid waste management methods such as garbage sorting and disposal. and this was especially true in the current research.

It is recommended that creating mindfulness among the general population and their investment alongside activities of NGOs is fundamental and essential part for proficient strong waste administration. According to (Trasias Mukama, 2016), "methods and Green technologies used by Non-governmental organizations (NGOs) especially recycling has a significant impact on solid waste management."

2. KEYWORDS:

Waste Segregation, Waste Management, Distribution, Inclusivity, Municipal Solid Waste Management, Sustainable Urban Environment

3. OBJECTIVES

The main objective of this present research work is to assess the state of waste collection and segregation plans and campaigns currently going on in India and finding out gaps which can be well handled by intervention from third parties like NGOs, NPOs, etc. On-ground physical surveys and cross sectional analysis of previous data from third party intervention and non-intervention data has been utilised. It may aid in quick and useful decisions for the purpose of administration and planning for a sustainable waste management practice.

Furthermore, occurrence and possibility of including green technologies and policies/practices is to be analysed to figure out appropriate ways to handle the situation.

4. LITERATURE REVIEW

Title of paper	Name of author s	Name & indexing of the Journal	Major findings of the study	Gaps addressed	Comments	No. of citations
Hazardous waste management	Carden , J.L Jr. (Jr, 1985)	international nuclear Information System	Discusses focusing on the indigenous ways of managing hazardous waste.	Focuses on specific technologies to dispose and manage radioactive waste	A different perspective on waste management	45

Development drivers for waste Management	David C Wilson (Wilson, 2007)	International Solid Waste Management	Identifies 6 broad groups of drivers for development in waste management	Issues in public health lead to a focused study on waste management	Waste Management with respect to the 21 st century households explained	12
Solar rooftop in India: Policies, challenges and outlook	(Goel, 2016)	Green Energy and environment (GEE)-	India 300+sunny days, RTPV increase needed	implementation on priority in different countries with India	This paper connects the geo-grid plants' system with the need of RTPV implementation	32
Green Marketing: A Study of Consumer Perception and Preferences in India	(Bhatia, 2013) , Mitra, A. (2013).	Electronic Green Journal, 1(36) - UCLA	Classification of consumers from Green Gauge Study of Roper Organization (2001) was adapted in this study.	Consumer thought process was cracked.	Smart study using statistical tools, provides confidence worthy data.	29
Adoption of Green Information Technology in India- Current Scenario	(Srivastava, 2012)	Journal of Information and Operations Management	This paper specifies the large organisations that have a dominant impact on the natural resources in the area of their operations in the IT industry.	The resources utilized by the IT industry was accounted for and analysis to reduce gap or resources take and saved was confirmed.	Brief but informed study based on historic facts and figures.	13

Advantages of Green Technology	(Akul, 2014) Sanjukt a Bannerjee and Ram Krishna Akul	Recent Research in Science and technology 6(1)	The report found out the category wise benefits of green technologies in a general context.	Practical use of environment friendly technology and deliverables	It summarized the whole conversation around the green technologies in a brief yet efficient manner.	7
Green Technologies vs Environment Sustainability in India	(G, 2017) Bhavana Ganga dhar and Ramakrishna Naidu G	International journal of Current Advanced Research	This paper evaluates the existing Green technologies on the scale of efficiency to see how clean they actually are.	Category wise critical evaluation of existing green technologies.	Precise articulation of categories of technologies is given.	9
Green Buildings- a case study on Green Technology	(N Aruna Kumari, 2013) N Aruna Kumari, Subhaji t Paul	International Journal of Scientific Research	Found out approaches used to rate, categorize buildings for implementation of Green technologies.	Bodies governing the green buildings and rating methods.	IGBC and national bodies covered with brief detail.	7
Emerging Green Technologies for the Manufacturing Sector	Ludivico Alcorta, (Alcorta,	UNIDO Report	It found various innovative techniques in each step of manufacturing.	Green method of manufacturing, procuring and distribution.	Technical report on Green Manufacturing	30

Green Technology and emerging trend	Syed Moina Sultana (Sultana, 2019)	International Research Journal of Engineering and Technology	Discover branches of Green Technology and includes the Green Nanotechnology as a major new clean research.	Green Chemistry which was less prevalent is studied along with general green area	New age and updated technical overview	18
Introducing Green Technology in Developing Nations	Sanjay Kumar, Manzar Hussain (Sanjay Kumar, 2017)	ProsPER Joint Research Journal	Green Technologies with respect to comparison analysis of other developing nations gave new outlook.	With Indian Railways as central focus, green practices and their applicability was judged.	Use of proper questionnaires and real data driven approach.	8
A Feasibility study on the application of green technology for sustainable agriculture development accessing policy impact on UNAPCAEM countries	Prf. Bishwambher Pyakuryal (Pyakuryal, 2009)	UNAPCAEM	Explores the role of varied policy in promotion of green technologies and compares with other member countries of UNAPCAEM	Suitable technology according to specific economy was the objective	Study based analytical work on policy decisions	6

The role of Green Roof technology in Urban Agriculture	Leigh J. Whittin ghill and D. Bradley Rowe. (Rowe, 2012)	Renewable Energies and Food Systems	Use of new age technologies to start vertical farming that require less space and water and flower faster and more organic	Positives and negatives of the urban farming	A simplified view of the hydroponic system / family	6
Contribution of Green Technology in Sustainable Development of Agriculture Sector	Ghadiy ali, T.R., Kayast h, M.M (Ghadi yali, 2012)	Journal of Environment Research and Development	Examines the impact of new green technologies in the Green Agriculture industry	Puts forth opportunities for the Green Industry	Comparati ve analysis and Introductio n of common green practices in Green Agricultur e	14
Technology Policies for a Green Revolution and Agriculture Transformation in Africa	Keijiro Otsuka (Otsuk a, 2010)	Journal of African Economics	Development of semi dwarf HYV seeds and origins	Comparative analysis of country and economy wise	Country wise diverse testing portfolio	4

Technology Adoption in Intensive Post-Green Revolution Systems	Douglas Gollin, Michael Morris, Derek Byerlee (Douglas, 2005)	American Journal of Agricultural Economics	HYV Seeds and their contribution in future revolutions	How Green Technologies bring about revolution	Cultural and world impact of GT	17
Smart Farm: Improving Agri Sustainability Using Modern IT	Chandra Krintz, Rich, Wolski, Nevena, Gulobovic, Benji Lampi, Varun Kulkarni, UC Bantra, Balaji S, Bruce R, Bo Liu (Chandra Krintz, 2016)	Business and Economic Research, 6(2), 440-454.	IT brings about connectivity and better distributions management	Thus, increasing scope of green tech.	Extrinsic factors of GT	27

Towards green technology : Maximizing benefits and minimizing harm	Marjan a Maksimovic (vic, 2017)	Springer, Singapore	Nano size of nano particle increases effect	Efficacy of green tech via nano components	New age nano technology perspective in the green conversation	19
Opportunities and Challenges of Nanotechnology in the green Economy	Ivo Lavicolly, Veruska Lerso, Wakter Ricciardi, Laura L Hodson, Mark Hoover (Ivo Lavicolly, 2014)	Lavicolli et env health	Talks about utilities of nanotechnology	Use of nano tech in green perspective	Opportunities and challenges both determined	127
Development and deployment of GT	Shu yuan Pan, Chihhao Fan, Yu Pin Lin (Shu yuan Pan, 2019)	Journal of Business Research, 101, 461-468.	Historical development compared with current and future potent technology	Past, current and future technologies analysed	Comparative view for a better judgment	4

The water retention capabilities of growing media for green roofs	<u>Abigail</u> Graces on, , Martha Stuart (Abigai Graces on, 2015)	Journal of ecologic engineering	Changes in water reduction capacity with less roots, devastating	Roots vs erosion	General view converted into scientific analysis	13
Advantages of Green Technology	Ghansham Das Soni (Soni, 2015)	International Journal of Research-Granthalayah	Draws conclusions on the basic advantages of Green technology.	Efficiency is compared with applicability	Precise analysis	5
Sustainable Technologies for Recycling and Reuse: an overview	Sureyya Meric, Huseyin Selcuk, Burca Onat, Atakan Ongen (Sureyya Meric, 2018)	Springer, Singapore	Recycle and Reuse, concept introduction and overview of their application	Change in GT Perception	General overview	40

Going Green in Business	Akhilesh Suresh, Pradeep Devadasam (Akhilesh Suresh, 2017)	International Journal of applied Engineering and Management	Inter relatedness of business and green production and marketing	The gap between using product and saving env	An interpersonal and human behaviour analysis	27
Green Technology Innovation: Anatomy of exploration processes from a learning perspective	Samuel Wicki, Eric Hansen (samuel, 2019)	Business Strategy Environment	How can innovation convert into monetary output without harming environment	Business techniques and brief models	How can social venture merge with business good for NV	30
Practices, Concerns, and Willingness to Participate in Solid Waste Management in Two Urban Slums in Central Uganda	(Trasia Muka, 2016)	Journal of Environmental and Public Health	Practices, Concerns, and Willingness to Participate in Solid Waste Management	Why do slums do/ do not practice waste segregation?	Gives a good idea of general citizen mindset.	25

Assessment of Municipal Solid Waste Management of Pune City using Geospatial Tools	(Nitin, 2014)	International Journal of Computer Applications	Assessment of Municipal Solid Waste Management	How and do slum living citizens participate in waste management ?	Focus on Solid waste management	18
Role of NGOs in Solid Waste Management: A Study in Different Municipalities of Manipur, India	(Raghmani, 2015)	Role of NGOs in Solid Waste Management	Researched on Municipality actions in Manipur	How efficient is the Municipality in waste management.	Focused on Manipur.	12

Table 1: Literature Review Table, author's contribution

Summary of literature review

Majority of the impact that comes in the Green Sphere of business/ life comes from turnkey projects granted by government or facilitated by national bodies like IGBC. India has huge potential but invests comparatively less on research and development as compared to other countries. The research and Development budget in any field of Green Technology is quite low for the current output and future potential. Talking specifically about waste management and segregation, it can be observed from this Research that government facilitated resources can only be utilised in full potential if the citizens are incentivised or made emotionally available to take up the task of segregation and waste disposal, along with the pre-requisites of having necessary resources to carry it out.

Current policy formed to promote Green Industry is not sufficient to meet the estimated and marketed goals. Green Industry would need an extravagant effort from not just the government sector but even the public including private companies and 3rd party

Green Technologies need not only be the highly sophisticated equipment that is not in reach of general citizens, but it is the essence of an ideology to reduce the human footprint on mother Earth. It can even be traditional or modern, that matters is its efficiency and applicability. Here, we refer to the Green movement of waste management using systematic waste management campaigns, behavioural change drives, implementing and making available karts and small lorries for waste disposal etc.

5. Research Gap(s) & areas of interest identified for further study

After reviewing the literature, it seems more viable to select a specific area of green technology and compare the historical upgradation of Green Technologies. Majority of the papers focused (General Green Technologies) most on Clean Energy and Green Infrastructure. These core categories come up as the biggest, most lucrative and have a huge potential for innovation.

Papers have focused on the technology, the consumer behaviour, the government response but very few papers have discussed the private policy implementation or Green Marketing Aspect of the Green Industry. I would use this gap to create a comprehensive but deep research project in the field of Green Technologies.

Also there are few to no research papers on the business models to convert green innovations into booming businesses, and this could be an interesting point to cover in my further research.

6. Methodology:

To evaluate the efficacy of the system of non-governmental organizations (NGOs) in reducing solid waste in Pune, Hadapsar, the qualitative method was utilised in the collection and analysis of data. Descriptive statistics were used in analysing primary data. Purposive along with simple random sampling were applied in the study to select the respondents, the study area Pune (Hadapsar) and nongovernmental organizations (NGOs). The data were collected using questionnaires. There were a total of two hundred and thirty-three (233) respondents in the study from two(2) NGOs; fifty (50) members from Bloom, a humanitarian aid organisation working to elevate the living conditions of slum dwellers. Bloom along with its Parent organisation GCGC Foundation, an environmental NGO took the initiative using the resources of Seva Sahyog Foundation to mobilise Man power for conducting this event. These group of people/ organisations has been chosen as they seemed to have sufficient knowledge on solid waste management. Close-ended questionnaire was applied in the study to gather the information from targeted respondents. The questionnaire questions were

constructed from relevant literature reviews, studies, and the research questions. The respondents specifically responded (in the close-ended questionnaire), to their answers by putting a tick mark in answers which they feel are most appropriate. Because each point is followed by alternate responses, the closed-ended questionnaire is easier to manage and use in terms of time. The management of NGOs and respondents were requested to sign an ethical agreement before questionnaires were distributed to be filled up. Similarly, some data received by the researcher during a visit to the Hadapsar Municipal Council office during the data collection period was used as secondary data in this study. The data for this study was analysed using descriptive statistics. The data was presented in tables with a focus on percentages, and the results were then subjectively analysed. The study assumes the following hypotheses:

H0: The methods (incentivising, dustbin distribution, behavioural change campaigns) used by NGOs have a significant impact in reducing solid waste management in Hadapsar, Pune.

H1: The methods (incentivising, dustbin distribution, behavioural change campaigns) used by NGOs have no significant impact in reducing solid waste management in Hadapsar, Pune.

Results

Out of the two thirty-three (233) questionnaires distributed (on day 1), one seventy-one (171) usable questionnaires were retrieved from respondents and analysed concerning day two (2).

According to the study's hypotheses, the majority of respondents' behaviour and actions agree that NGOs' methods (incentivising, dustbin distribution, behavioural change campaigns, and segregation) have a significant impact on reducing solid waste in the environment and thus reducing the health risk posed by this waste.

This study's null hypothesis was found to be false. Overall, all of the NGOs' strategies complement one another in lowering solid waste in the environment, resulting in a more sustainable environment.

In detail itinerary and method: On 25th and 26th of January 2020, a comparative survey of 2 days was conducted during a campaign conducted by the NGOs Bloom, GCGC Foundation & Seva Sahyog Foundation, which were focused on waste segregation and collection. The campaign was such that on Day 1 a primary survey was taken after which 2 dustbins, 1 for wet and 1 for dry was given. The distribution occurred after survey was conducted and thus, the event did not affect the responses. On day 2, the next day, a campaign speech for waste segregation awareness was conducted by our partner organisation and dustbins to the remaining population was distributed and the survey was conducted after that. Thus, the impact for post campaign behaviour was mapped.

These two surveys had a series of questions devised specifically for the purpose of deriving on-field behaviour change. This, in the further research, will be compared with data from other slum areas where 3rd party campaigns/ NGOs had not taken place to derive a relationship between the intervention of NGOs and the effectiveness in the waste segregation and management process.

The initiative that has been documented was carried out as follows.

“The task was to provide each household with two separate waste baskets marked with wet waste and dry waste individually. With this event the surveys and interviews were conducted while distributing the waste bins and educating mass about the importance and way of waste segregation. 1700+ waste baskets had to be distributed in that area. The hard-work and organisational skills of all the highly reputed foundations aided in the swift distribution without any hassles. The kids from the slums proved to be one of the main sources without which such a huge event would be unthinkable. All the volunteers were organised into various groups and were given two tasks, one was to mark the baskets with wet waste and dry waste and two was to distribute it into an efficient manner while conducting the interviews. All in all the event ended with more than 850 households getting two waste baskets. That would mean that a more than 1700+ baskets were distributed. This event ended with children and families thanking the volunteers and our organisation heads giving a speech on the importance of differentiating between the types of wastes and in all the importance of ridding waste in the right manner.” - Mr. Nitish Jain, founder, President Bloom.GCGC Foundation



Figure. 1-3, 6-7 & 9: Waste Bin distribution drive photos by Volunteers; Source: Bloom Organisation, showcasing activity carried out by Bloom Organisation, GCGC Foundation & Seva Sahyog Foundation



IMG. 4,7 (MAP): Map of Hadapsar, BhimNagar Area Map ; Source: GoogleMaps, <https://www.pmc.gov.in/sites/default/files/12.czon5.pdf>

Primary Data Collection:

1. Type of Research

Experimental Research Design

2. Type of Research Design

Longitudinal Descriptive Research and

Multiple Cross-sectional research – for comparison in null hypothesis. (Conduction of repeated survey on 26th January)

3. Research Hypothesis if framed

An increased activity with more frequency and more efficiency results in efficient and regular segregation of wet & dry waste being collected.

Directional Alternative Hypothesis: Presence of an NGO/ 3rd party campaign increases efficiency of waste segregated and collected due to the supporting factors for segregating waste.

Null hypothesis:

To compare an alternative view of absence of third party campaigns and NGO's secondary data has also been considered under the literature review to compare the results of low literacy area waste segregation levels.

Hypothesis: Areas with low level of NGO/ 3rd party campaigns on waste segregation, have low levels of proper waste segregation and collection initiative.

4. Population

Population: Hadapsar, Bhim Nagar, Pune, Maharashtra – Slums

We had selected this population to intervene a research with our organisation's on-going initiative of educating masses on waste segregation through behavioural campaign. This population consists of slum dwellers with very low income level group of people. Literacy rate in slums range from 10-15 percent in these modern day scenarios, and even though it is increasing but, formal education is a lacking point. These slums were chosen to model a statement of how effective external organisations (apart from governments) are in inculcating a sense of responsibility and a sustainable model of waste segregation in people with low literacy levels. This reduces an extraneous factor of literary awareness and thus, helps us get a clear idea of implementable solutions that are really effective in making a change in the waste segregation routine of citizens in this populous country.

5. Sampling Considerations

Population: 650 + households, 900+ people, of Hadapsar, Bhim Nagar, Pune, Maharashtra – Slums

Sample Size: 250 houses

Elements: Household members – father, mother (earning members), offspring, sibling, grandparents. Any 1 was surveyed representatively.

Sampling frame: Mentioned in the survey responses (available on demand)

Samples: House member available at the time of survey

Sampling unit: Slum dweller, living in the surveyed slum house.

Sample size calculation:

Sampling error: Non-sampling errors might include errors while interviewing, non-compliance with questions, rigidity to answer, psychological barriers.

Sampling techniques: Simple Random Sampling

6. Variables

Independent Variables: Presence of NGO/ 3rd part campaign

Dependent Variables: Waste Collected, Waste Segregated

Increased NGO/campaign intervention – efficient (waste segregation, waste collection)

Moderating Variables: Distribution Channel for waste collection, Presence of Separate Dustbins for segregation, Frequency of awareness orientations, Quality of orientation/campaign,

Intervening/ Mediating Variables: Political stability in the area, domestic help availability in house chores

Endogenous Variables: Effectiveness of waste segregated from source till dump/ site, Quality of Dustbins Provided, Knowledge Reception from orientation

Exogenous Variables: Damage of Dustbins/ waste karts, Incentives Provided by Government, Availability of Dustbins, Awareness of Usage/ Segregation.

Extraneous Variables: Weather calamities like floods, Season (rainy, winters), Domestic violence conditions, Literacy Levels, Political disturbances.

7. Scales used both general and attitude measurement scales with justifications

1. Do you use dustbin?

Yes, No Response: Simple factual question

2. How do you dispose of your garbage?

Garbage collection system

Dump those nearby

Just through away

Burn It

Others

(Multiple option question to select a single option: To understand current attitude of the respondent.)

3. How often garbage collection happens in your area?

Daily

Every 2 days

Once a week

Monthly

(This was included only in the 2nd questionnaire taken on the day 2. As we wanted to map the effect of the dustbin distribution with the increased pride of the respondent to get the true answer.)

4. Can you distinguish between wet & dry waste?

Yes, No answer (Simple factual answer to test their knowledge pre & post campaign.)

5. What does your garbage include?

More wet

More solid

Wet & solid

Others

(To determine the awareness as well as the constitution of the waste.)

6. What effect do you think open garbage disposal cause? / Do you know how open garbage disposal affects Nature and You?

Hygiene issues

Environmental issues

Others

No(Shows awareness level and reception of knowledge before the campaign- this was only asked in the 1st day questionnaire)

7. Do you think as a responsible citizen it is your duty to dispose waste properly? /
What do you think is your responsibility as citizens to dispose garbage/waste?
Yes, No and Open Ended in day 2 questionnaire
(to understand their seriousness and participation in the citizen responsibility.)

8. Will you dispose you waste properly?
Yes, No answer (To understand the respondent's attitude towards waste disposal. This question was interviewed and the answer was based on expressions/ sarcasm/ humour/ seriousness of the respondent.)

*Photo of the Respondent was also taken (Some refused as it is sensitive) – this was taken to ensure authenticity of interviewer's survey.

8. Instruments Used-

Formalised and Concealed questionnaire which was scheduled and the researchers helped the respondent in answering the questions and also inferred expressions to mark the data responses.

9. Tools to be used

To analyse and record data: Google forms and Microsoft excel were used.

Solid Waste Management

Strong waste is any sludge, refuse, or garbage that has resulted from an air pollution control facility, a water source treatment plant, or a waste activity plant, as well as other undesirable materials, such as strong, fluid, or vaporous materials that are by-products or rejects of business, mechanical, mining, network exercises, or farming tasks. In general, solid waste management includes funding, activity, development, and facility design for collecting, transportation, and reusing methods all the way to final trash disposal, as rightly mentioned in the paper by Mr. Nitin (nitin, 2014)

Segregation in Waste

In Waste Management Segregation , Segregation is the process of sorting garbage into biodegradable and non-biodegradable categories. Natural garbage, such as papers, leaves from trees, kitchen detritus, organic items, and vegetables, is biodegradable, whereas non-

biodegradable waste includes plastics, paper, glass, metal, paints, synthetics, bulbs, splash, and other materials.

Green Technologies and Conventions:

GREEN TECHNOLOGY by definition is a technology that is created with an intent to mitigate or nullify. When we research the traditional and modern technologies and types of Green Technologies, we can observe that, green technologies are not just highly sophisticated tools, out of reach of normal humans that cost a fortune and aren't viable, but, Green Technologies are ways of incorporating nature in ever-day life functioning, that cost comparatively less in long run and makes life worth living. These are ways that could use modern day intelligence tech or even combine the most ancient and pristine techniques in a modern context.

Green technologies are nothing, but, incorporating sustainable to live the way we live our lives. It's the least costly.

There are certain Stigmas concerned with the agenda of Green and Renewables like, they are always high cost, have huge maintenance, would not recover costs and are only meant for CSR initiatives etc. One of the Objectives of this paper is to revise the definitions that have been misinterpreted and remove the stigma's, negative or positive, and provide a clear situation of what green technologies are along with the conversations around it in the Indian Context.

The motivation: In today's world, this fact is established that without incorporation nature positive ways in our daily lives, habits, production methods etc., it would be impossible to look into the needs of a future. Environmental anomalies have increased unnaturally in the past few years, and initiating informed conversation on this agenda is necessary than ever. I wish to connect the factual findings with the behavioural findings to incorporate reasons for why Green Technologies would be or would not be a boon for this century.

In the waste management sector, Green technologies could mean from using incinerators, thermal gas plants, biogas plants to simple behavioural change campaigns where use of separate dustbins is promoted. The area under study, as per the methodology, covers the aspect using third party organisations to segregate waste at the generation site itself. As per the preliminary research, (nitin, 2014), Segregation at source is the main step in waste management and is done in two significant classifications: wet waste and dry waste. Wet waste is the bio degradable solid waste incorporates private waste of all kinds, and waste from markets and slaughterhouse. Dry waste is the recyclable strong waste that incorporates paper and plastic of numerous types barring unsafe waste material.

One important phenomena observed in the population under study was that upon observational and secondary data from Seva Sahyog Foundation, it appeared that *even after dustbins were distributed, the waste collected and disposed finally did not increase in the*

expected quantity. This was due to the reason, that the slums had narrow lanes which made it difficult for municipality trucks to collect waste daily. Due to this, the frequency of waste collected reduced to weekly. After introduction of Smaller Karts and easy segregations system and implementation of dry and wet waste dustbin distribution scheme, a huge jump in awareness and conformity of segregation was observed. This observation was proceeded with the data analysis given below.

7. Data Analysis & Interpretation

Analysis: Questionnaire Day 1

1. Do you use dustbins?

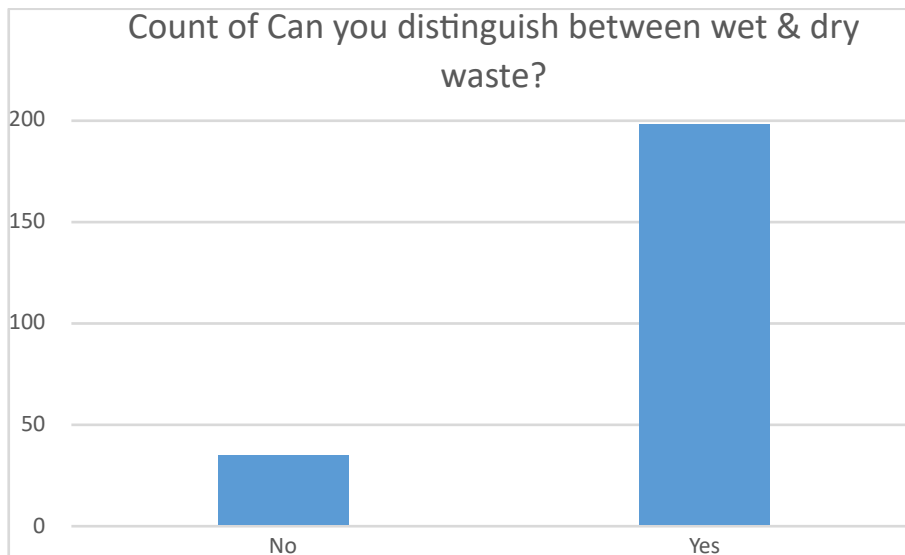
Do you use dustbin?	Count of Do you use dustbin?
No	37
Yes	196

- 2.

2. Can you distinguish between wet & dry waste?

Can you distinguish between wet & dry waste?	Count of Can you distinguish between wet & dry waste?
No	35
Yes	198

- 3.



3. How do you Dispose off your Garbage?

How do you dispose of your garbage	Count of How do you dispose of your garbage
Dump those nearby	21
Garbage collection system	181
just through away	31

4. Will You dispose off your waste properly?

Will you dispose you waste properly?	Count of Will you dispose you waste properly?
No	176
Yes	57

5.

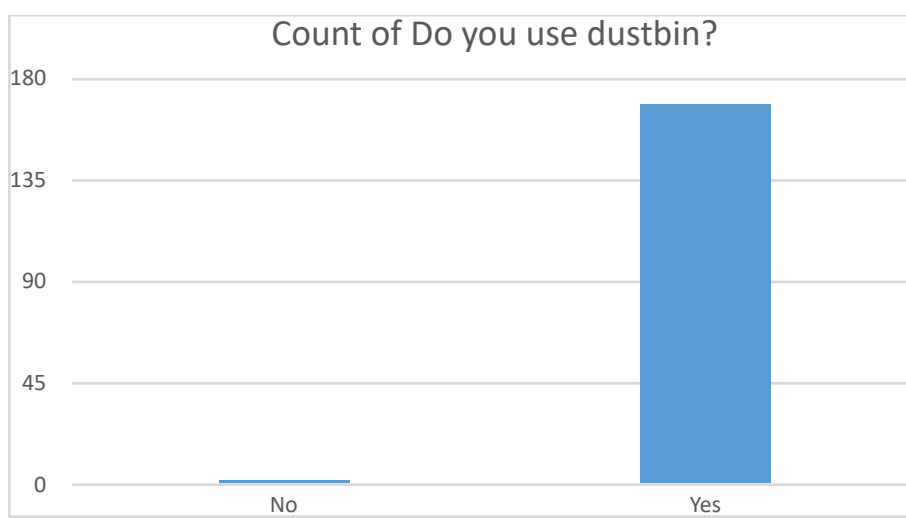
Do you know how open garbage disposal affects You?	Count of Do you know how open garbage disposal affects Nature?
Environmental issues	97
Hygiene issues	77
No	59

6. What does your waste include more of?

What does your garbage include?	Count of What does your garbage include?
Both	106
more solid	72
more wet	55

Analysis: Questionnaire Day 2

1. Do you use dustbins?



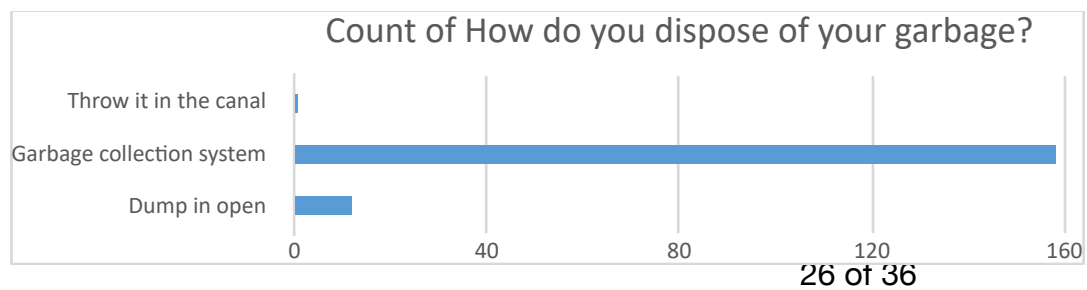
Do you use dustbin?	Count of Do you use dustbin?
No	2
Yes	169

2.

2. How do you dispose of your garbage?

How do you dispose of your garbage?	Count of How do you dispose of your garbage?
Dump in open	12
Garbage collection system	158
Throw it in the canal	1

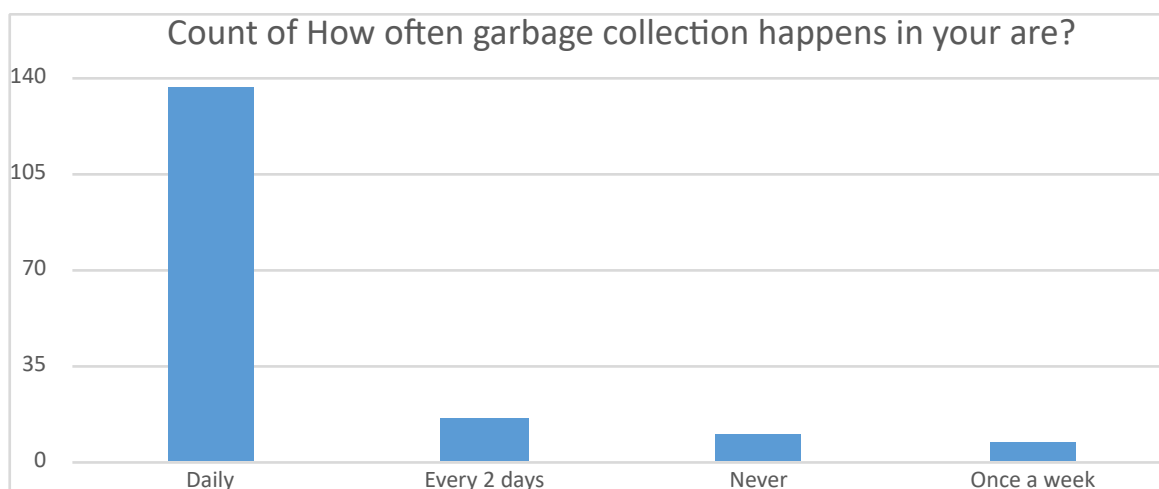
3.



3. How often garbage collection happens in your area?

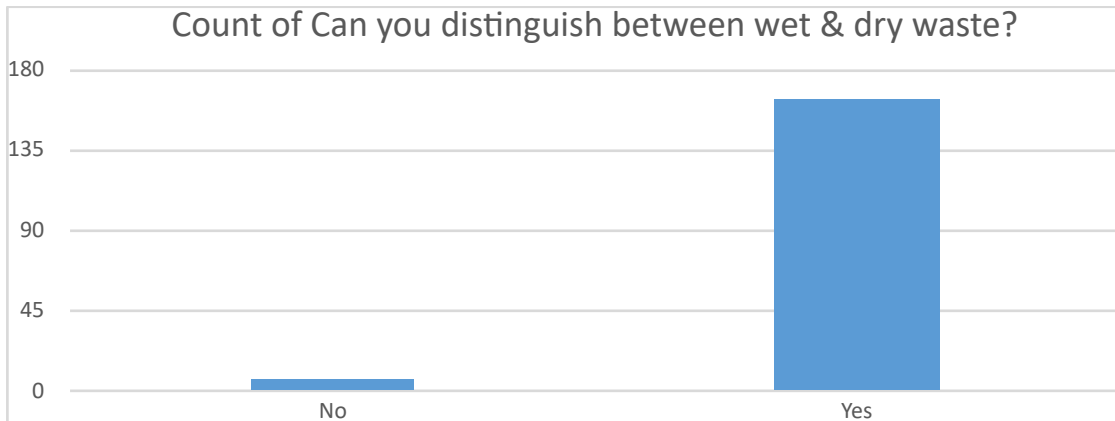
How often garbage collection happens in your are?	Count of How often garbage collection happens in your are?
Daily	136
Every 2 days	16
Never	10
Once a week	7

4.



4. Can you distinguish between wet & dry waste?

Can you distinguish between wet & dry waste?	Count of Can you distinguish between wet & dry waste?
No	7
Yes	164

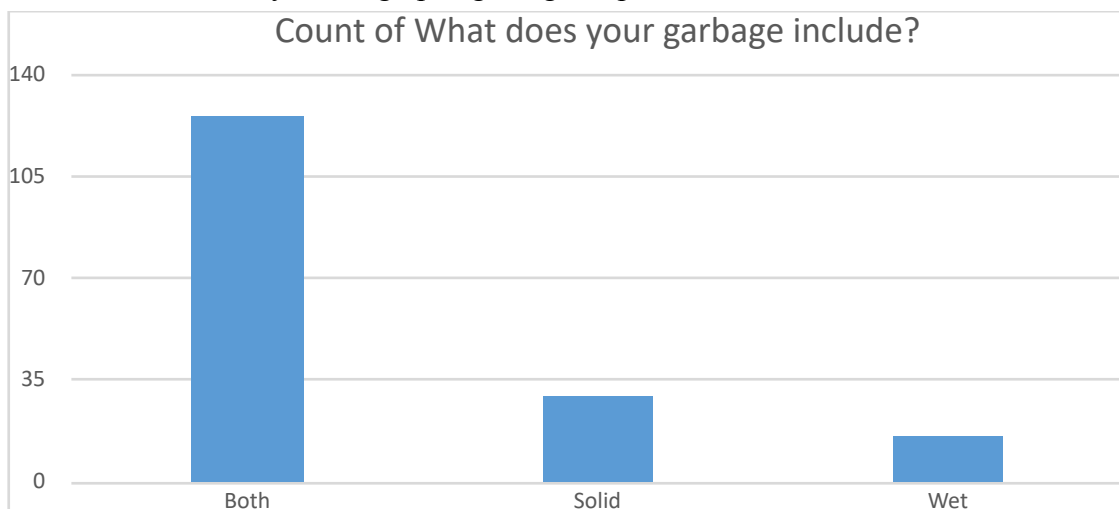


5. What does your garbage include?

What does your garbage include?	Count of What does your garbage include?
Both	126
Solid	29
Wet	16

6.

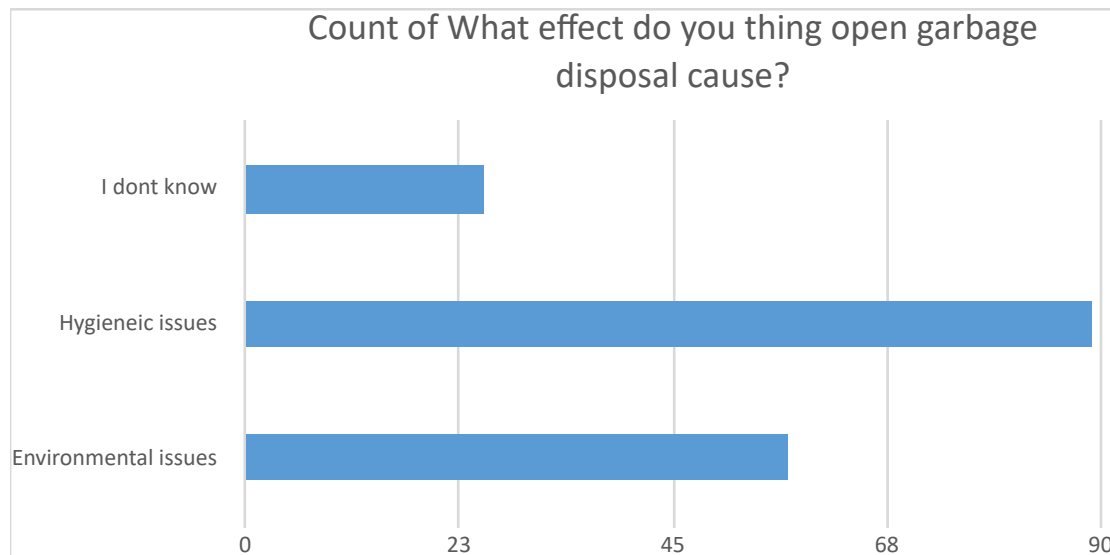
6. What effect do you think open garbage disposal cause?



What effect do you think open garbage disposal cause?	Count of What effect do you think open garbage disposal cause?
Environmental issues	57
Hygienic issues	89
I don't know	25

7.

7. Do you think as a responsible citizen it is your duty to dispose waste properly?



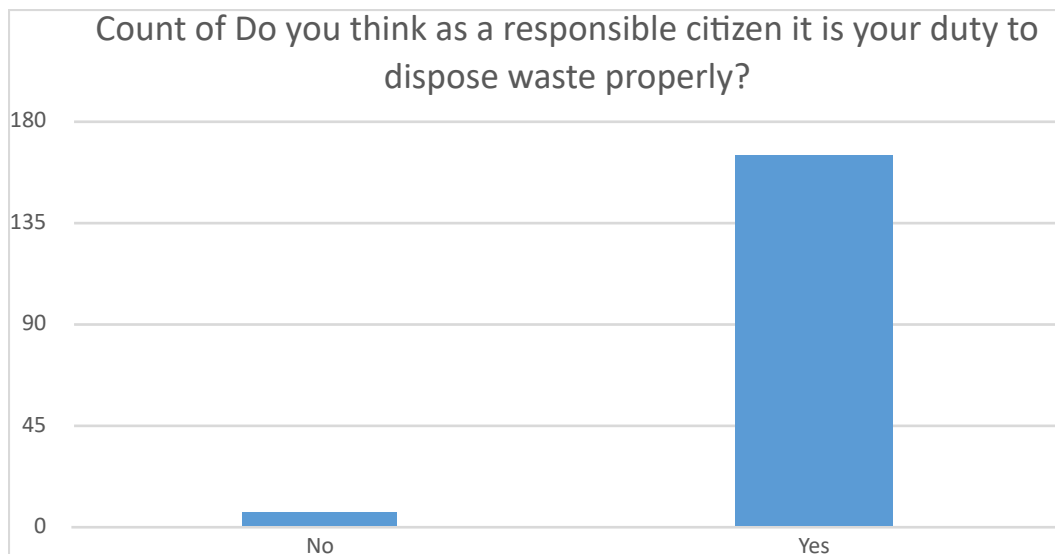
Do you think as a responsible citizen it is your duty to dispose waste properly?	Count of Do you think as a responsible citizen it is your duty to dispose waste properly?
No	6
Yes	165

8.

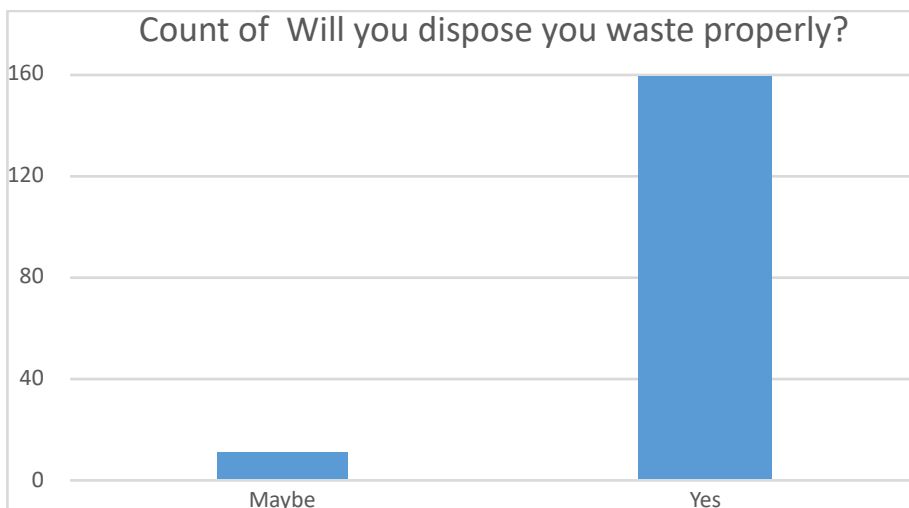
8. Will you dispose your waste properly?

Will you dispose you waste properly?	Count of Will you dispose you waste properly?
Maybe	11

Yes	160
-----	-----



9.



The Data was collected over a period of 2 days and the questionnaire was prepared in such manner that past notions could even be judged. The respondents were first asked questions and then provided with the dustbins and information on day 1, to impart knowledge on waste segregation and disposal.

Please note that every 6 months, the Seva Sahyog foundation carries out behavioural change campaigns and distributing dustbins in the slum locality. This can be reflected in the awareness level of the slum dwellers. When asked questions like “Do you use Dustbins?” the answer was 2 No and 169 Yes i.e., 98.8% awareness. This showed the sense of responsibility in using dustbins. Furthermore, when asked “Can you distinguish between wet & dry waste?” a whopping answer of 7:164 or 95.9 percent awareness was mapped who answered Yes.

To judge the level of responsibility they showcase for the commitment of third party bodies towards them, they were asked questions like “*How do you dispose of your garbage?*” (12 dump in open, 158 Garbage collection system (92.37%), 1 throws it in canal), “*What effect do you think open garbage disposal cause?*” (this had distributed answers with 57 saying Environmental issues, 89 believing hygiene issues, and 25 did not know). Such answers had Majority of the slum dwellers answering knowledge conforming answers.

This was quite constant from the day 1 interviews as well. Day 1 had 233 respondents but only few of the questions were thoroughly asked.

One major difference was seen in the question “*Will you dispose you waste properly?*” On Day 1: 176 answered No (75.55%) & 57 yes (24.4%) and on Day 2: Maybe 11, yes 160 93.5) , no: 0. This shows the impact of dustbin distribution (incentivising the slum dwellers). Now, as per our experience while surveying some slum dwellers even used the previously distributed dustbins for other purposes like washing clothes, as a bucket etc which created a slight variation in the range but that is still $r < 0.7$ which is an acceptable range to calculate results of the initiative.

On day 1, confusion even persisted while answering the question of “*Will you dispose off waste properly?*” to which the answer was 176 No and 57 Yes, showcasing majority people in indifference and carelessness.

Furthermore, on Day 1, the question was asked: “*What does your garbage include?*” where we got mixed answer of Both: 106 (45.4%), More wet: 55 (23.6%) and more solid: 72 (30.9%). This shows the necessity of waste segregation at the site.

These answers, though seem straight forward were marked in the presence of a volunteer who even took into consideration, extraneous values like sarcasm, lack of interest, shy nature etc to get a true picture of the situation.

8. Conclusion:

This set of Data showcases a few points:

- Third party intervention and knowledge awareness sessions do play a major role in behaviour change
- These sessions must be conducted frequently to mark a visible change and make it a habit
- Waste Management should be incentivised and appropriate conditions should be created for the people to carry it out
- Social inclusion is necessary for the urban slums contribute massively in the city waste. Even though it is lower than city urban waste, it still contributes huge chunk, and even more solid and mixed waste.

Open unloading of solid waste influence the encompassing zone of the unloading site, delivers exceptionally terrible odour at the hour of decay. In PMC region such circumstance seldom emerges due to effective and logical MSW practices planned by utilising present day innovation.

The research is valuable in anticipating the city's waste management strategy in future. It accentuates on the significance of the necessity of strong waste management framework.

9. Limitations

The research was done using longitudinal approach over a gap of one (1) day and using cross sectional data from the same city and Africa. The cross sectional data would have gaps in the sense, of time and size or area under study. Furthermore, the paper takes into consideration on ground efforts and data collected by two (2) NGOs thus, extraneous variables which might arise in other NGOs would be missing. Considering this, the overall population under study and the lucrativeness of the secondary and primary research would allow a confident inference from the data collected.

10. Managerial Implications

In these crucial times, the social responsibility of a firm is even more detrimental in portraying its image in society and making it sustainable in its processes and management. With these times, an organisation can use this research paper to fulfil its social responsibility by being a third party intervening in the situation of waste management to efficiently handle the segregations and distribution & disposal of the waste from low inclusivity areas of the society.

Even governments can review their policies and their effectiveness based on the on-ground reality of the current solutions and resources that are facilitated in these areas. In fact, this information will be shared with the municipal corporator of Hadapsar area, to take further concrete actions in this area making it an actionable effort to increase efficacy in waste management.

11. Data Availability

The dataset used during the study is available from the corresponding author upon reasonable request.

12. Disclosure

The content of this paper is solely the responsibility of the authors and does not necessarily represent the official views of Bloom Foundation.

13. Conflicts of Interest

The authors declare that they have no conflicts of interest.

14. Authors' Contributions

The author conceptualised the study and was involved in data collection, analysis, and description. All authors read and approved the final manuscript.

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