Chintan's Assessment Tool for Informal Sector Inclusion (CATISI) in Solid Waste Management

CHINTAN
ENVIRONMENTAL RESEARCH
AND ACTION GROUP

About Chintan

Chintan is a registered non-profit organization that promotes equitable, inclusive, and sustainable growth for all. Its mission is to reduce ecological footprints and increase environmental justice through systemic change via partnerships, grassroots capacity building, advocacy and research, and sustainable, scalable models on the ground.

Authors

Bharati Chaturvedi, Aman Luthra, and Aiden Short

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238, Sidhartha Enclave, New Delhi - 110014, India
Email: info@chintan-india.org
Phone: +91-11-46574171 or 46574172
Website: www.chintan-india.org

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Introduction

Traditionally in India, solid waste management is mainly conducted by the informal sector. Waste pickers, collect waste from people's homes for a fee and bring it to a local dumping station. Many of them are organized into associations, co-operatives or self-help groups, and others function as independent agents. They segregate the waste, salvaging as much as 20% of reusable and recyclable material, and sometimes even compost the organic portion. Most of them are poor, and recycling industry enables them to earn a livelihood.

Over the last few decades per capita solid waste generation has increased substantially in urban areas worldwide, incapacitating existing solid waste management systems[1]. As a result, private firms are being contracted to relieve some of the pressures on municipal governments. This trend displaces waste pickers that are part of the informal sector waste economy. The informal sector, however, has been shown to be much more efficient than the formal sector in collecting, transporting, segregating and recycling waste. A 2011 study[2], for instance, showed that in Cairo, Egypt, the cost of handling waste in the informal sector was 3 Euros per ton, while it was 10 Euros per ton in the formal sector. Similarly, in Lima, Peru, one informal sector actor handled 30 tons of waste while the formal sector handled only one ton!

As a result of growing knowledge about the importance and efficiency of the informal sector in India, several policies and rules have been issued for the inclusion of informal sector into waste management programs[3]. These policies recognise the crucial role of the informal sector in solid waste management and the fact that waste collection and recycling can be an important tool in alleviating poverty. Some new solid waste systems, however, are being developed and implemented contradicting these rules and policies[4]. To a certain extent, this is due to the lack of accurate information, reduced capacity, and no tangible means available for assessing whether or not a system is inclusive of the informal sector. The Chintan Assessment Tool for Informal Sector Inclusion Tool (CATISI) in Solid Waste Management seeks to fill this vacuum.

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[1] Hoornweg, Daniel and Perinaz Bhada-Tata. 2012. *What a Waste: A Global Review of Solid Waste Management.* Washington, DC: World Bank

[2] Ellen Gunsilius, Bharati Chaturvedi, Anne Scheinberg with contributions from Adrian Coad, Sofia Garcia Cortes, *The Economics of the Informal Sector in Solid Waste Management* (CWG GIZ April 2011)

[3] Some examples of policies are inclusive of waste pickers are the *National Action Plan for Climate Change 2009* and the *National Environment Policy 2006.* Similarly, both the Plastic Waste (Management and Handling) Rules 2011 and the Electronic Waste (Management and Handling) Rules 2011 have asked for including informal sector associations in waste management programs and projects.

[4] Chintan, 2011. *Failing the Grade.* Delhi: Chintan.

About the Assessment Tool

Chintanhas worked with informal waste pickers over the past decade, resulting in broad experience and a deep understanding of the nature of the informal sector in solid waste management systems. The purpose of this Chintan Assessment Tool for Informal Sector Inclusion (CATISI) is to help evaluate the extent of the inclusion of existing waste pickers in current and new waste management systems. The main objective is to then provide local government bodies and municipalities with the necessary information to set up easy-to-monitor, inclusive, and transparent solid waste management systems. Once municipalities and urban local bodies (ULBs) undertake the initiative to self-administer the assessment tool and share the results, they could call upon other agencies, such as non-governmental organizations, consultants, etc., to help administer them, if they so desire.

The assessment tool is built as a series of multiple-choice questions that lead to a subsequent set of questions. Some of the questions require corroborating documented evidence to complete the evaluation process. A final score, generated at the end, reflects the "inclusiveness" of the project/plan in question. The questions in the tool are designed to apply to ongoing and/or planned future projects. It is recommended that the tool be used on an annual basis for all projects, so "inclusiveness" of the informal sector can be monitored continuously throughout the lifecycle of the project.

The tool is expected to evaluate individual waste management projects. Each waste management project could either be provided by the municipality itself or by contracting it out to a private waste firm or an NGO. In either case, each project is expected to involve a combination of services. For instance, a private waste firm could be contracted to provide door-to-door collection services and transportation services from the source to a destination, such as a waste-to-energy facility or a landfill. This same firm could also be involved in providing segregation and recycling services. To account for the variability in the types of services that a specific project involves, the tool is divided into the following seven sections:

- **Section I** asks the evaluator to identify the combination of services involved in the project. The evaluator then completes all the relevant sections for the respective services. The evaluator is also expected to note whether the project has applied for, or has been approved to receive, carbon credits.

- **Sections II to VII.** Based on the response to Question 1, Section 1, the evaluator then completes the appropriate subsequent sections. Each section is comprises a series of questions relevant to the type of service in the respective section. The first question in each section asks whether or not an impact assessment has been previously conducted. If an impact assessment has not been completed, it is not possible for the evaluator to answer any of the subsequent questions, therefore, the evaluator would have to either defer the evaluation until after such an impact assessment is completed, or accept a score of zero for the evaluation. The questions in each section are assigned a weight according to their importance in the evaluation. For each question, there are three columns in the numeric response columns. The

evaluator fills in Column I based on pre-assigned instructions. Column II contains a pre-designated weight for the question, and Column III is a score calculated by multiplying the Columns I and II. In addition, for each question, a score is calculated as a sum of the individual response line items in Column C. A percentage score for each question is derived as a proportion of the total weight assigned to that question.

A team of experts, including Chintan staff, academic researchers, and a group of informal sector waste workers assigned criteria weights to the questions and response options using a consensus-based approach, whereby each decision was made by unanimous agreement. A pair-wise comparison approach assessed the importance of one question against another. So, if the group decided that three out of four questions were equally important, the respective questions were assigned equal weights. If the fourth question was deemed more/less important, then the group was given a vote as to how much more/less important the question was compared to the other three questions. An average of the responses was then used to calculate weights for each question algebraically. A similar process assigned weights to response options within each question. *InteRa* or *integration radar,* an evaluation and visualization tool developed by researchers at the Imperial College in London, in collaboration with the International Solid Waste Association, provided the analytical framework for the development of the tool[5].

[5] Velis, C.A. et al. 2012. An analytical framework and tool ('InteRa') for integrating the informal recycling sector in waste and resource management systems in developing countries. *Waste Management & Research* 30 (9) suppl: 43-66

Interpreting the Final Score

A final "inclusiveness" score for each section is based on responses to the questions. The score can range between 0% and 100%, with a 0% score indicating the project is not at all inclusive of the informal sector and 100% reflecting that the project made every effort possible (within the parameters of the questions in this tool) to be inclusive of the informal sector. Scores in between the maximum and minimum indicate the relative degree of inclusiveness. A numeric score allows for comparisons across and within projects. For instance, if a waste-to-energy project in a city fares better than one in another city, then there is opportunity for learning across projects to make them more inclusive. Within a project, since we expect this assessment to be conducted on an annual basis, progress (or lack thereof) towards "inclusiveness" can be monitored over time.

In addition, the percent score for each question, as described above, can be used to find areas and opportunities for improving the degree of "inclusiveness" in a project. For instance, a project may receive a score of 60% for collection and transportation services, which shows there is much room for improvement. To determine specific areas of improvement, they need to assess the percent scores on individual questions, e.g. they may have received 100% on question 1, 50% on question 2, 50% on question 3, 100% on question 4, and 20% on question 5. Based on this assessment, they can focus efforts on improving scores on questions 2, 3, 4 and 5 by, respectively, hiring or contracting local waste pickers in their operations, providing a space for refuse separation, and implementing rehabilitation plans that generate livelihoods for the waste pickers affected by the project.

Chintan's Assessment Tool for Informal Sector Inclusion (CATISI)

Name of Project: _____

Name of Evaluator: _____

Designation of Evaluator: _____

Date of Evaluation: _____

Section I. Background

To answer the questions below, please check the appropriate boxes:

1. What type(s) of waste management service(s) do/will you provide? [*Select all that apply, especially if the project provides a combination of services, then proceed to the appropriate section(s), as indicated. It is likely that this project provides a combination of the services listed below. If the project involves additional service providers, please attach the relevant contract document(s) to this survey.*]

   - ☐ Collection and transportation services
   - ☐ Segregation and recycling services
   - ☐ Composting services [*Select only if this service is provided in tandem with any of the other services.*]
   - ☐ Waste-to-energy services
   - ☐ Landfill operations and maintenance (O&M) or upgrading services
   - ☐ Landfill closure services

2. Has the project applied for or been approved for carbon credits under the Clean Development Mechanism?

   - ☐ Yes
   - ☐ No

3. Has the project been assessed for its impacts on informal sector waste pickers or recyclers?

   - ☐ Yes, we conducted our own assessment or used an existing assessment. [*Attach the results of the assessment to this survey.*]

- ☐ No [*Appendix A provides guidance on conducting such an assessment.]*

4. Has a customer satisfaction survey been conducted since the project started?

   - ☐ Yes [*Attach the results of the customer satisfaction survey.*]
   - ☐ No [*Appendix B provides guidance for conducting such a survey.*]

5. If yes, based on the survey results, what is the percentage of customers satisfied with the levels of service provided?

   _____

Section II. Collection and Transportation Services

	A		B		C
1. **How many informal sector waste pickers/ recyclers were/are likely to be impacted by collection and transportation services?** [*Please provide an estimate*[6] *here and attach a separate explanation of the basis for the estimate.*]	_____				
2. **How do/will you staff the project's operations?** [*Select one of the options specified below.*]					**30 points**
☐ By hiring any willing candidates as employees or contractors. [*Enter 0% in column A and proceed to Question 4.*]	_____	X	30	=	_____
☐ By hiring individual local waste pickers/ recyclers as employees or contractors OR by contracting/partnering with an association of local waste pickers/recyclers or an NGO that works with local waste pickers/recyclers. [*Enter the percentage of impacted waste pickers/recyclers that have been/will be contracted/hired*[7] *in column A. Provide copies of the contracts and verification that workers are/will be local waste pickers/recyclers.*]	_____	X	30	=	_____
Score on Question 2 [*Add the scores in column C.*]					_____
Percent score on Question 2 [*Calculate score as a percentage of 30.*]					_____
3. **Do/will you allow waste pickers/recyclers access to segregation space?** [*Select one of the options specified below.*]					**15 points**
☐ Yes, we do/will provide a clean space for segregation. [*Enter 100% in column A.*]	_____	X	15	=	_____
☐ Yes, we do/will provide space for segregation but have no plans to make any improvements to the space. [*Enter 50% in column A.*]	_____	X	15	=	_____

[6] In the absence of an impact assessment, Appendix C provides guidance for estimating the number of informal sector waste workers that might be impacted as a result of this service.

[7] For projects that only hire or contract part-time workers, use the following example to calculate the percentage of workers affected: If a particular service in a project employs 30 part-time workers, and is expected to displace 50 doorstep collectors, the percentage of workers affected is: (30*0.5/50)*100 = 30%. Part time workers are assigned a factor of 0.5 in this calculation.

	A		B		C
☐ No, we will not permit waste pickers (or recyclers) inside any spaces controlled by us. [*Enter 0% in column A.*]	_____	X	15	=	_____
☐ We do not have any protocols in place regarding access to segregation space. [*Enter 0% in column A.*]	_____	X	15	=	_____
Score on Question 3 [*Add the scores in column C.*]					_____
Percent score on Question 3 [*Calculate score as a percentage of 15.*]					_____
4. **Which of the following do/will you provide to the informal sector waste pickers/recyclers contracted to provide services in this project?** [*Select all that apply.]*					**25 points**
☐ Rights to the waste materials. [*Enter 100% in column A*]	_____	X	5	=	_____
☐ Wages. [*Enter 100% in column A*]	_____	X	2	=	_____
☐ IDs. [*Enter 100% in column A*]	_____	X	2	=	_____
☐ Health insurance. [*Enter 100% in column A*]	_____	X	2	=	_____
☐ Uniforms. [*Enter 100% in column A*]	_____	X	2	=	_____
☐ Personal protective equipment. [*Enter 100% in column A*]	_____	X	2	=	_____
☐ Health services. [*Enter 100% in column A*]	_____	X	2	=	_____
☐ Skills training. [*Enter 100% in column A*]	_____	X	2	=	_____
☐ Access to social security and other schemes. [*Enter 100% in column A*]	_____	X	2	=	_____
☐ Basic facilities (toilets, washrooms etc.). [*Enter 100% in column A*]	_____	X	2	=	_____
☐ Training/support to partners (e.g. law enforcement) in order to reduce harassment and atrocities faced by informal sector waste workers	_____	X	2	=	_____
Score on Question 3 [*Add the scores in column C.*]					_____
Percent score on Question 3 [*Calculate score as a percentage of 25.*]					_____
5. **Did/will you do anything towards the rehabilitation of waste pickers/recyclers affected by this project?** [*Select all that apply.]*					**30 points**

	A		B		C
☐ We have provided/will provide alternative skills training that has/will generate livelihoods. [*Entered the percentage of impacted waste pickers that have or are expected to find livelihoods as a result of the skills training in column A.]*	_____	X	30	=	_____
☐ We have found/will find alternative livelihoods for those impacted. [*Enter the percentage of impacted waste pickers that have been/will be placed into alternative employment*[8] *in column A.*]	_____	X	30	=	_____
☐ No, we have no plans for rehabilitation of those impacted.	_____	X	30	=	_____
Score on Question 4 [*Add the scores in column C.*]					_____
Percent score on Question 4 [*Calculate score as a percentage of 30.*]					_____
SECTION SCORE [*Add the numbers in column C to calculate.*]					_____

Comments and Observations

[8] Alternative employment could mean the waste picker affected has been employed in another service as part of this project. If they are employed on a part-time basis, similar rules as mentioned previously apply to these calculations.

Section III. Segregation and Recycling Services

	A		B		C
1. **How many informal sector waste pickers/ recyclers were/are likely to be impacted by segregation and recycling services?** [*Please provide an estimate*[9] *here and attach a separate explanation of the basis for the estimate.*]					
2. **How do/will you staff the project's operations?** [*Select one of the options specified below.*]					**30 points**
☐ By hiring any willing candidates as employees or contractors. [*Enter 0% in column A and proceed to Question 4.*]	_____	X	30	=	_____
☐ By hiring individual local waste pickers/ recyclers as employees or contractors OR by contracting/partnering with an association of local waste pickers/recyclers or an NGO that works with local waste pickers/recyclers. [*Enter the percentage of impacted waste pickers/recyclers that have been/will be contracted/hired*[10] *in column A. Provide copies of the contracts and verification that workers are/will be local waste pickers/recyclers.*]	_____	X	30	=	_____
Score on Question 2 [*Add the scores in column C.*]					_____
Percent score on Question 2 [*Calculate score as a percentage of 30.*]					_____
3. **Which of the following do/will you provide to the informal sector waste pickers/recyclers contracted to provide services in this project?** [*Select all that apply.]*					**20 points**
☐ Wages. [*Enter 100% in column A*]	_____	X	2	=	_____
☐ IDs. [*Enter 100% in column A*]	_____	X	2	=	_____
☐ Health insurance. [*Enter 100% in column A*]	_____	X	2	=	_____

[9] In the absence of an impact assessment, Appendix C provides guidance for estimating the number of informal sector waste workers that might be impacted as a result of this service.

[10] For projects that only hire or contract part-time workers, use the following example to calculate the percentage of workers affected: If a particular service in a project employs 30 part-time workers, and is expected to displace 50 doorstep collectors, the percentage of workers affected is: (30*0.5/50)*100 = 30%. Part time workers are assigned a factor of 0.5 in this calculation.

	A		B		C
☐ Uniforms. [*Enter 100% in column A*]	_____	X	2	=	_____
☐ Personal protective equipment. [*Enter 100% in column A*]	_____	X	2	=	_____
☐ Health services. [*Enter 100% in column A*]	_____	X	2	=	_____
☐ Skills training. [*Enter 100% in column A*]	_____	X	2	=	_____
☐ Access to social security and other schemes. [*Enter 100% in column A*]	_____	X	2	=	_____
☐ Basic facilities (toilets, washrooms etc.). [*Enter 100% in column A*]	_____	X	2	=	_____
☐ Training/support to partners (e.g. law enforcement) in order to reduce harassment and atrocities faced by informal sector waste workers	_____	X	2	=	_____
Score on Question 3 [*Add the scores in column C.*]					_____
Percent score on Question 3 [*Calculate score as a percentage of 20.*]					_____
4. **Did/will you do anything towards the rehabilitation of waste pickers/recyclers affected by this project?** [*Select all that apply.]*					**30 points**
☐ We have provided/will provide alternative skills training that has/will generate livelihoods. [*Entered the percentage of impacted waste pickers that have or are expected to find livelihoods as a result of the skills training in column A.]*	_____	X	30	=	_____
☐ We have found/will find alternative livelihoods for those impacted. [*Enter the percentage of impacted waste pickers that have been/will be placed into alternative employment*[11] *in column A.*]	_____	X	30	=	_____
☐ No, we have no plans for rehabilitation of those impacted.	_____	X	30	=	_____
Score on Question 4 [*Add the scores in column C.*]					_____
Percent score on Question 4 [*Calculate score as a percentage of 30.*]					_____
5. **Who do/will you sell recyclables to?** [*Select one of the options specified below.*]					**20 points**

[11] Alternative employment could mean the waste picker affected has been employed in another service as part of this project. If they are employed on a part-time basis, similar rules as mentioned previously apply to these calculations.

	A		B		C
☐ To the same dealers that waste pickers (or recyclers) currently sell to or were selling to before we began operations. [*Enter 100% in column A and provide contact information for the recyclables dealers that you sell to.*]	_____	X	20	=	_____
☐ To other recyclables dealers in the informal sector. [*Enter 50% in column A and provide contact information for the recyclables dealers that you sell to.*]	_____	X	20	=	_____
☐ To reprocessing firms or we process recyclables in-house in our own facilities. [*Enter 0% in column A.*]	_____	X	20	=	_____
Score on Question 5 [*Add the scores in column C.*]					_____
Percent score on Question 5 [*Calculate score as a percentage of 20.*]					_____
SECTION SCORE [*Add the numbers in column C to calculate.*]					_____

Comments and Observations

Section IV. Composting Services

This section is to be completed if you provide composting services in addition to any other services.

	A		B		C
1. **How do/will you staff the project's operations?** [*Select one of the options specified below.*]					**60 points**
☐ By hiring any willing candidates as employees or contractors. [*Enter 0% in column A and proceed to Question 4.*]	_____	X	60	=	_____
☐ By hiring individual local waste pickers/ recyclers as employees or contractors OR by contracting/partnering with an association of local waste pickers/recyclers or an NGO that works with local waste pickers/recyclers. [*Enter the percentage of impacted waste pickers/recyclers that have been/will be contracted/hired*[12] *in column A. Provide copies of the contracts and verification that workers are/will be local waste pickers/recyclers.*]	_____	X	60	=	_____
Score on Question 1 [*Add the scores in column C.*]					_____
Percent score on Question 1 [*Calculate score as a percentage of 50.*]					_____
2. **Which of the following do/will you provide to the informal sector waste pickers/recyclers contracted to provide services in this project?** [*Select all that apply.]*					**40 points**
☐ Wages. [*Enter 100% in column A*]	_____	X	4	=	_____
☐ IDs. [*Enter 100% in column A*]	_____	X	4	=	_____
☐ Health insurance. [*Enter 100% in column A*]	_____	X	4	=	_____
☐ Uniforms. [*Enter 100% in column A*]	_____	X	4	=	_____
☐ Personal protective equipment. [*Enter 100% in column A*]	_____	X	4	=	_____

[12] For projects that only hire or contract part-time workers, use the following example to calculate the percentage of workers affected: If a particular service in a project employs 30 part-time workers, and is expected to displace 50 doorstep collectors, the percentage of workers affected is: (30*0.5/50)*100 = 30%. Part time workers are assigned a factor of 0.5 in this calculation.

	A		B		C
☐ Health services. [*Enter 100% in column A*]	_____	X	4	=	_____
☐ Skills training. [*Enter 100% in column A*]	_____	X	4	=	_____
☐ Access to social security and other schemes. [*Enter 100% in column A*]	_____	X	4	=	_____
☐ Basic facilities (toilets, washrooms etc.). [*Enter 100% in column A*]	_____	X	4	=	_____
☐ Training/support to partners (e.g. law enforcement) in order to reduce harassment and atrocities faced by informal sector waste workers	_____	X	4	=	_____
Score on Question 2 [*Add the scores in column C.*]					_____
Percent score on Question 2 [*Calculate score as a percentage of 40.*]					_____
SECTION SCORE [*Add the numbers in column C to calculate.*]			_____		

Comments and Observations

Section V. Waste-to-Energy Services

	A		B		C
1. **How many informal sector waste pickers/ recyclers were/are likely to be impacted by waste-to-energy services?** [*Please provide an estimate*[13] *here and attach a separate explanation of the basis for the estimate.*]					
2. **How do/will you staff the project's operations?** [*Select one of the options specified below.*]					**30 points**
☐ By hiring any willing candidates as employees or contractors. [*Enter 0% in column A and proceed to Question 4.*]	_____	X	30	=	_____
☐ By hiring individual local waste pickers/ recyclers as employees or contractors OR by contracting/partnering with an association of local waste pickers/recyclers or an NGO that works with local waste pickers/recyclers. [*Enter the percentage of impacted waste pickers/recyclers that have been/will be contracted/hired*[14] *in column A. Provide copies of the contracts and verification that workers are/will be local waste pickers/recyclers.*]	_____	X	30	=	_____
Score on Question 2 [*Add the scores in column C.*]					_____
Percent score on Question 2 [*Calculate score as a percentage of 30.*]					_____
3. **Do/will you allow waste pickers/recyclers access to segregation space?** [*Select one of the options specified below.*]					**15 points**
☐ Yes, we do/will provide a clean space for segregation. [*Enter 100% in column A.*]	_____	X	15	=	_____
☐ Yes, we do/will provide space for segregation but have no plans to make any improvements to the space. [*Enter 50% in column A.*]	_____	X	15	=	_____

[13] In the absence of an impact assessment, Appendix C provides guidance for estimating the number of informal sector waste workers that might be impacted as a result of this service.

[14] For projects that only hire or contract part-time workers, use the following example to calculate the percentage of workers affected: If a particular service in a project employs 30 part-time workers, and is expected to displace 50 doorstep collectors, the percentage of workers affected is: (30*0.5/50)*100 = 30%. Part time workers are assigned a factor of 0.5 in this calculation.

	A		B		C
☐ No, we will not permit waste pickers (or recyclers) inside any spaces controlled by us. [*Enter 0% in column A.*]	_____	X	15	=	_____
☐ We do not have any protocols in place regarding access to segregation space. [*Enter 0% in column A.*]	_____	X	15	=	_____
Score on Question 3 [*Add the scores in column C.*]					_____
Percent score on Question 3 [*Calculate score as a percentage of 15.*]					_____
4. **Which of the following do/will you provide to the informal sector waste pickers/recyclers contracted to provide services in this project?** [*Select all that apply.]*					**25 points**
☐ Wages. [*Enter 100% in column A*]	_____	X	2.5	=	_____
☐ IDs. [*Enter 100% in column A*]	_____	X	2.5	=	_____
☐ Health insurance. [*Enter 100% in column A*]	_____	X	2.5	=	_____
☐ Uniforms. [*Enter 100% in column A*]	_____	X	2.5	=	_____
☐ Personal protective equipment. [*Enter 100% in column A*]	_____	X	2.5	=	_____
☐ Health services. [*Enter 100% in column A*]	_____	X	2.5	=	_____
☐ Skills training. [*Enter 100% in column A*]	_____	X	2.5	=	_____
☐ Access to social security and other schemes. [*Enter 100% in column A*]	_____	X	2.5	=	_____
☐ Basic facilities (toilets, washrooms etc.). [*Enter 100% in column A*]	_____	X	2.5	=	_____
☐ Training/support to partners (e.g. law enforcement) in order to reduce harassment and atrocities faced by informal sector waste workers	_____	X	2.5	=	_____
Score on Question 4 [*Add the scores in column C.*]					_____
Percent score on Question 4 [*Calculate score as a percentage of 25.*]					_____
5. **Did/will you do anything towards the rehabilitation of waste pickers/recyclers affected by this project?** [*Select all that apply.]*					**30 points**

	A		B		C
☐ We have provided/will provide alternative skills training that has/will generate livelihoods. [*Entered the percentage of impacted waste pickers that have or are expected to find livelihoods as a result of the skills training in column A.]*	_____	X	30	=	_____
☐ We have found/will find alternative livelihoods for those impacted. [*Enter the percentage of impacted waste pickers that have been/will be placed into alternative employment*[15] *in column A.*]	_____	X	30	=	_____
☐ No, we have no plans for rehabilitation of those impacted.	_____	X	30	=	_____
Score on Question 5 [*Add the scores in column C.*]					_____
Percent score on Question 5 [*Calculate score as a percentage of 30.*]					_____
SECTION SCORE [*Add the numbers in column C to calculate.*]			_____		

Comments and Observations

[15] Alternative employment could mean the waste picker affected has been employed in another service as part of this project. If they are employed on a part-time basis, similar rules as mentioned previously apply to these calculations.

Section VI. Landfill O&M and Upgrading Services

	A		B		C
1. **How many informal sector waste pickers/ recyclers were/are likely to be impacted by landfill O&M and upgrading services?** [*Please provide an estimate*[16] *here and attach a separate explanation of the basis for the estimate.*]			_____		
2. **How do/will you staff the project's operations?** [*Select one of the options specified below.*]					**30 points**
☐ By hiring any willing candidates as employees or contractors. [*Enter 0% in column A and proceed to Question 4.*]	_____	X	30	=	_____
☐ By hiring individual local waste pickers/ recyclers as employees or contractors OR by contracting/partnering with an association of local waste pickers/recyclers or an NGO that works with local waste pickers/recyclers. [*Enter the percentage of impacted waste pickers/recyclers that have been/will be contracted/hired*[17] *in column A. Provide copies of the contracts and verification that workers are/will be local waste pickers/recyclers.*]	_____	X	30	=	_____
Score on Question 2 [*Add the scores in column C.*]					_____
Percent score on Question 2 [*Calculate score as a percentage of 30.*]					_____
3. **Do/will you allow waste pickers/recyclers access to segregation space?** [*Select one of the options specified below.*]					**15 points**
☐ Yes, we do/will provide a clean space for segregation. [*Enter 100% in column A.*]	_____	X	15	=	_____
☐ Yes, we do/will provide space for segregation but have no plans to make any improvements to the space. [*Enter 50% in column A.*]	_____	X	15	=	_____

[16] In the absence of an impact assessment, Appendix C provides guidance for estimating the number of informal sector waste workers that might be impacted as a result of this service.

[17] For projects that only hire or contract part-time workers, use the following example to calculate the percentage of workers affected: If a particular service in a project employs 30 part-time workers, and is expected to displace 50 doorstep collectors, the percentage of workers affected is: (30*0.5/50)*100 = 30%. Part time workers are assigned a factor of 0.5 in this calculation.

	A		B		C
☐ No, we will not permit waste pickers (or recyclers) inside any spaces controlled by us. [*Enter 0% in column A.*]	_____	X	15	=	_____
☐ We do not have any protocols in place regarding access to segregation space. [*Enter 0% in column A.*]	_____	X	15	=	_____
Score on Question 3 [*Add the scores in column C.*]					_____
Percent score on Question 3 [*Calculate score as a percentage of 15.*]					_____
4. **Which of the following do/will you provide to the informal sector waste pickers/recyclers contracted to provide services in this project?** [*Select all that apply.]*					**25 points**
☐ Rights to the waste materials. [*Enter 100% in column A*]	_____	X	5	=	_____
☐ Wages. [*Enter 100% in column A*]	_____	X	2	=	_____
☐ IDs. [*Enter 100% in column A*]	_____	X	2	=	_____
☐ Health insurance. [*Enter 100% in column A*]	_____	X	2	=	_____
☐ Uniforms. [*Enter 100% in column A*]	_____	X	2	=	_____
☐ Personal protective equipment. [*Enter 100% in column A*]	_____	X	2	=	_____
☐ Health services. [*Enter 100% in column A*]	_____	X	2	=	_____
☐ Skills training. [*Enter 100% in column A*]	_____	X	2	=	_____
☐ Access to social security and other schemes. [*Enter 100% in column A*]	_____	X	2	=	_____
☐ Basic facilities (toilets, washrooms etc.). [*Enter 100% in column A*]	_____	X	2	=	_____
☐ Training/support to partners (e.g. law enforcement) in order to reduce harassment and atrocities faced by informal sector waste workers	_____	X	2	=	_____
Score on Question 4 [*Add the scores in column C.*]					_____
Percent score on Question 4 [*Calculate score as a percentage of 25.*]					_____

	A		B		C
5. **Did/will you do anything towards the rehabilitation of waste pickers/recyclers affected by this project?** [*Select all that apply.]*					**30 points**
☐ We have provided/will provide alternative skills training that has/will generate livelihoods. [*Entered the percentage of impacted waste pickers that have or are expected to find livelihoods as a result of the skills training in column A.]*	_____	X	30	=	_____
☐ We have found/will find alternative livelihoods for those impacted. [*Enter the percentage of impacted waste pickers that have been/will be placed into alternative employment*[18] *in column A.*]	_____	X	30	=	_____
☐ No, we have no plans for rehabilitation of those impacted.	_____	X	30	=	_____
Score on Question 5 [*Add the scores in column C.*]					_____
Percent score on Question 5 [*Calculate score as a percentage of 30.*]					_____
SECTION SCORE [*Add the numbers in column C to calculate.*]			_____		

Comments and Observations

[18] Alternative employment could mean the waste picker affected has been employed in another service as part of this project. If they are employed on a part-time basis, similar rules as mentioned previously apply to these calculations.

Section VII. Landfill Closure Services

	A		B		C
1. **How many informal sector waste pickers/ recyclers were/are likely to be impacted by landfill closure services?** [*Please provide an estimate*[19] *here and attach a separate explanation of the basis for the estimate.*]					
2. **How do/will you staff the project's operations?** [*Select one of the options specified below.*]					**35 points**
☐ By hiring any willing candidates as employees or contractors. [*Enter 0% in column A and proceed to Question 4.*]	_____	X	35	=	_____
☐ By hiring individual local waste pickers/ recyclers as employees or contractors OR by contracting/partnering with an association of local waste pickers/recyclers or an NGO that works with local waste pickers/recyclers. [*Enter the percentage of impacted waste pickers/recyclers that have been/will be contracted/hired*[20] *in column A. Provide copies of the contracts and verification that workers are/will be local waste pickers/recyclers.*]	_____	X	35	=	_____
Score on Question 2 [*Add the scores in column C.*]					_____
Percent score on Question 2 [*Calculate score as a percentage of 35.*]					_____
3. **Which of the following do/will you provide to the informal sector waste pickers/recyclers contracted to provide services in this project?** [*Select all that apply.]*					**30 points**
☐ Wages. [*Enter 100% in column A*]	_____	X	3	=	_____
☐ IDs. [*Enter 100% in column A*]	_____	X	3	=	_____
☐ Health insurance. [*Enter 100% in column A*]	_____	X	3	=	_____

[19] In the absence of an impact assessment, Appendix C provides guidance for estimating the number of informal sector waste workers that might be impacted as a result of this service.

[20] For projects that only hire or contract part-time workers, use the following example to calculate the percentage of workers affected: If a particular service in a project employs 30 part-time workers, and is expected to displace 50 doorstep collectors, the percentage of workers affected is: (30*0.5/50)*100 = 30%. Part time workers are assigned a factor of 0.5 in this calculation.

	A		B		C
☐ Uniforms. [*Enter 100% in column A*]	_____	X	3	=	_____
☐ Personal protective equipment. [*Enter 100% in column A*]	_____	X	3	=	_____
☐ Health services. [*Enter 100% in column A*]	_____	X	3	=	_____
☐ Skills training. [*Enter 100% in column A*]	_____	X	3	=	_____
☐ Access to social security and other schemes. [*Enter 100% in column A*]	_____	X	3	=	_____
☐ Basic facilities (toilets, washrooms etc.). [*Enter 100% in column A*]	_____	X	3	=	_____
☐ Training/support to partners (e.g. law enforcement) in order to reduce harassment and atrocities faced by informal sector waste workers	_____	X	3	=	_____
Score on Question 3 [*Add the scores in column C.*]					_____
Percent score on Question 3 [*Calculate score as a percentage of 30.*]					_____
4. **Did/will you do anything towards the rehabilitation of waste pickers/recyclers affected by this project?** [*Select all that apply.]*					**35 points**
☐ We have provided/will provide alternative skills training that has/will generate livelihoods. [*Entered the percentage of impacted waste pickers that have or are expected to find livelihoods as a result of the skills training in column A.]*	_____	X	35	=	_____
☐ We have found/will find alternative livelihoods for those impacted. [*Enter the percentage of impacted waste pickers that have been/will be placed into alternative employment*[21] *in column A.*]	_____	X	35	=	_____
☐ No, we have no plans for rehabilitation of those impacted.	_____	X	35	=	_____
Score on Question 4 [*Add the scores in column C.*]					_____
Percent score on Question 4 [*Calculate score as a percentage of 35.*]					_____

[21] Alternative employment could mean the waste picker affected has been employed in another service as part of this project. If they are employed on a part-time basis, similar rules as mentioned previously apply to these calculations.

	A		B		C
SECTION SCORE [*Add the numbers in column C to calculate.*]			_____		
Comments and Observations					

Conclusion

Per capita waste generation rates have increased dramatically over the past few decades putting pressure on municipalities to find new solutions to managing the problem. One such solution has been to contract with private waste firms for providing waste management services, which is displacing the informal sector that has traditionally managed waste in urban areas. Acknowledging the important role that the informal sector plays, many new rules and policies have been issued asking for inclusion of this sector into waste management projects but these are inconsistently followed and enforced. To address this, Chintan has developed CATISI (Chintan's Assessment Tool for Informal Sector Inclusion) to evaluate the degree of inclusiveness of the informal sector in waste management projects. The tool is a series of questions that when answered leads to an overall "inclusiveness" score and allows municipalities to comply with established rules and policies as well as ensure that informal sector livelihoods are not lost without rehabilitation plans in place.

CHINTAN
ENVIRONMENTAL RESEARCH
AND ACTION GROUP

Chintan Environmental Research and Action Group
238, Sidhartha Enclave, New Delhi - 110014, India
Email: info@chintan-india.org
Phone: +91-11-46574171 or 46574172
Website: www.chintan-india.org

Appendix A

A Guide to Assessing the Impact of Waste Management Projects on Informal Sector Waste Workers

CHINTAN
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About Chintan

Chintan is a registered non-profit organization that promotes equitable, inclusive, and sustainable growth for all. Its mission is to reduce ecological footprints and increase environmental justice through systemic change via partnerships, grassroots capacity building, advocacy and research, and sustainable, scalable models on the ground.

Authors

Bharati Chaturvedi and Aman Luthra

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238, Sidhartha Enclave, New Delhi - 110014, India
Email: info@chintan-india.org
Phone: +91-11-46574171 or 46574172
Website: www.chintan-india.org

Introduction

Cities worldwide are struggling with the growing problem of finding adequate ways to manage increasing quantities and new kinds of waste that are being generated, such as new kinds of packaging, CFL bulbs, etc. In countries such as India, where economic growth has resulted in simultaneously growing consumption levels this means that not only is total waste generated increasing over time, but perhaps more importantly, the rate of per capita waste generation is increasing very rapidly and the composition of waste is also changing[1].

In many such growing cities, a large segment of waste pickers— who informally manage the city's garbage—not only derive a source of income from urban waste, they also provide a crucial environmental and public health service to the city[2]. Globally, informal sector waste pickers comprise one percent of the urban population. However, according to estimates, as much as 15 percent of the global informal sector waste picker population live and work in India. In the city of Delhi alone, as many as 150,000 informal workers survive off the waste economy[3].

As municipalities try to modernize their waste management systems, a common solution is to hire private waste firms to provide these services. Contracting out waste management services to private firms often displaces existing informal sector workers who were providing those services. Aside from the loss of livelihood to this community of informal sector waste workers, privatization has increased the overall cost of waste management. The provision of waste management services by the informal sector has traditionally been more cost effective and efficient in terms of material recovery and recycling rates[4]. The implementation of new waste management systems that aim to provide a city and its inhabitants with the most efficient services must, ideally, include the informal sector or, in the worst case, provide rehabilitation to those affected. Rehabilitation must involve finding a long-term, sustainable source of livelihood that, at the very least, generates comparable or higher income for those being rehabilitated.

There are many examples in cities around the world, where the informal sector has been successfully incorporated into new systems of waste management. For instance, the Bhopal Municipal Corporation passed an order in 2011 that includes

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[1] Hoornweg, Daniel and Perinaz Bhada-Tata. 2012. *What a Waste: A Global Review of Solid Waste Management.* Washington, DC: World Bank

[2] Chintan. 2009. *Cooling Agents: An Analysis of Greenhouse Gas Mitigation by the Informal Recycling Sector in India.* New Delhi: Chintan Environmental Research and Action Group

[3] Chintan. 2003. *Space for Waste: Planning for the Informal Recycling Sector*. New Delhi: Chintan Environmental Research and Action Group

[4] Gunsilius, E., B. Chaturvedi, and A. Scheinberg. 2011. *The Economics of the Informal Sector in Solid Waste Management.* Eschborn: GTZ and CWG

informal sector waste workers in door-to-door garbage collection[5]. In the Philippines, to reduce the volume of waste entering the landfill, and to include informal sector waste workers, in 2007, a material recovery facility was set up where waste workers can access and segregate the waste in much cleaner and safer environments than the landfill[6]. In Colombia, more recently, informal sector waste workers now receive payment from the city of Bogota for providing waste collection and transportation services[7].

Often, the problem is that new systems are implemented without adequate understanding of their impact on the existing informal sector. To address this issue, Chintan has developed this guide to help decision makers assess and understand the impact of privatization on the existing informal sector. The results should yield information for finding ways to include existing informal sector workers and/or developing appropriate rehabilitation plans for them. For instance, in Ghazipur, Delhi, Chintan conducted a socio-economic impact assessment on waste-pickers dependent on the local landfill, to understand the impact of a proposed waste-to-energy facility. Based on the assessment, Chintan advocated for the inclusion and rehabilitation of the prospective displaced waste workers, once the waste-to-energy plant became operational.

This assessment impact guide outlines the process, and provides a questionnaire that can be used, to assess the impact of a proposed contracting project on the existing informal sector. The last section provides some recommendations on how decision makers can use the results of the assessment to make informed decisions on inclusion and/or rehabilitation of the informal sector. This document proposes guidelines on how to think through an impact assessment. Decision makers can use this as a starting point to develop their own assessment tool appropriate to the context for which it is to be applied. An example of such an assessment is a report based on a study conducted by Chintan on the socio-economic impact of a waste-to-energy plant in Okhla, Delhi[8].

Assessment Process

This section outlines a high-level process for conducting an impact assessment of waste management systems implementation on the existing informal sector. This process should, at a minimum, comprise the following four steps.

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[5] Chintan. 2011. *Failing the Grade: How Cities across India are Breaking the Rules, Ignoring the Informal Recycling Sector and Unable to Make the Grade.* Delhi: Chintan

[6] Paul, J.G. et al. "End-of-the-pipe" material recovery to reduce waste disposal and to motivate the informal sector to participate in site improvements at the Calajunan dumpsite in Iloilo City, Panay, Philippines. Proceedings Sardinia 2007, Eleventh International Waste Management and Landfill Symposium. S. Margherita di Pula, Cagliari, Italy; 1 - 5 October 2007

[7] http://wiego.org/informal-economy/bogota-waste-pickers-celebrate

[8] Chintan. 2012. *"Give Back Our Waste": What the Okhla Waste-to-Energy Plant has done to Local Waste Pickers.* Delhi: Chintan

Step 1. Understand the current informal waste sector landscape

The informal waste sector is often a complex network of workers who collect, separate, transport, and recycle waste at various levels. For any project, it is important to understand the impact on various workers along the entire chain. In order to do that, it is necessary to have a clear understanding of the existing processes and all the workers involved.

In Delhi, for instance, waste and recyclable materials are collected, separated, transported, recycled, and disposed of by different sets of waste workers. Waste generators, such as households, institutions, restaurants, and shops produce waste and either dump it at illegal dumpsites themselves or give it to door-to-door collectors. Often, waste generators also sell dry recyclables, such as newspapers, glass, and metal to itinerant buyers, sometimes known as *kabaris.* Mixed waste (other than the dry recyclables sold to the itinerant buyer) may be collected by informal sector waste workers or formal sector waste managers (such as municipalities or private contractors). These formal or informal sector waste collectors may aggregate the material at a central point in the neighborhood, such as a municipal bin (sometimes referred to as a *dhalao*). *Dhalao* spaces are also often used by informal sector workers to separate and store recyclable materials. Some informal sector waste workers specialize in scavenging the *dhalaos* to collect recyclable materials. Municipalities or private contractors collect waste from the municipal bins and transport it to the landfill. At the landfill, too, informal sector waste workers often scavenge to find recyclable materials that have made their way past the various prior levels along the material recovery chain. In addition to waste and recyclables given to door-to-door collectors and itinerant buyers, waste generators might dump their waste in illegal open dumps and litter streets and other public spaces. Some informal sector waste workers specialize in scavenging the streets and open dumps to salvage recyclables. All these informal sector collectors separate the recyclables into broad categories and sell them to small junk dealers who sell to larger junk dealers who then sell them to recycling units. Junk dealers often employ people to separate recyclables into finer categories.

The waste management landscape is often a complex mosaic involving informal and formal waste workers at various levels. In many cities across India, the situation might be similar, but they differ in some crucial ways. Before one can assess the impact of a waste management project on the livelihood of the informal sector, one needs to know exactly who is affected and how. Some ways to get a better grip on this complex landscape is by reading existing literature on the subject published by academics, NGOs, development agencies, and the government. Some examples of such studies are provided below:

- Chintan. 2003. *Space for Waste: Planning for the Informal Recycling Sector*. New Delhi: Chintan Environmental Research and Action Group

- Hoornweg, Daniel and Perinaz Bhada-Tata. 2012. *What a Waste: A Global Review of Solid Waste Management.* Washington, DC: World Bank
- Ministry of Environment and Forests. 2011. *Report of the Committee to Examine the Role of Waste Pickers in Municipal Solid Waste Management.* New Delhi: Government of India
- UNHABITAT. 2010. *Solid Waste Management in the World's Cities.* London: Earthscan

Step 2. Survey the impact on the waste worker population

Once there is a clear understanding of the waste management landscape and the waste workers affected by it is identified, a survey instrument needs to be developed. Multiple instruments may be required if various levels of waste workers are affected. Some possible survey questions include:

- Name
- Age
- Gender
- Address
- Phone number
- Name of spouse
- Age of spouse
- Do you do waste related work right now? (Yes/No)
    - If yes, what specific waste related work do you do? (Door-to-door collector, itinerant buyer, *pheri* worker, *dhalao* worker, landfill worker, waste separator, junk dealer, or other)
    - If yes, where do you collect the waste from and where do you sell it?
    - If no, have you done any waste related work in the past? (Yes/No)
        - If yes, what specific waste related work did you do? (Door-to-door collector, itinerant buyer, *pheri* worker, *dhalao* worker, landfill worker, waste separator, junk dealer, or other)
        - If yes, why did you discontinue this work?
- Have you done or do you do any non-waste related work? (Yes/No)
    - If yes, what work have you done or do you do?
- Does your spouse do waste related work right now? (Yes/No)
    - If yes, what specific waste related work does your spouse do? (Door-to-door collector, itinerant buyer, *pheri* worker, *dhalao* worker, landfill worker, waste separator, junk dealer, or other)
    - If yes, where does your spouse collect the waste from and where does your spouse sell it?
    - If no, has your spouse done any waste related work in the past? (Yes/No)
        - If yes, what specific waste related work did your spouse do? (Door-to-door collector, itinerant buyer, *pheri* worker, *dhalao* worker, landfill worker, waste separator, junk dealer, or other)

        - If yes, why did your spouse discontinue this work?
- Has your spouse done or does your spouse do any non-waste related work? (Yes/No)
    - If yes, what work has your spouse done or does your spouse do?
- How many children do you have?
- What is the age and gender of each of your children?
- Do any of your children do waste related work? If yes, which child/ren and what specific waste service do they perform?
- Do any of your children go to school? If yes, which child/ren? If no, why not?
- What is your average daily/weekly/monthly household income?

Once the survey instrument is prepared, it should be pilot tested with a small sample within the target population, in order to identify and rectify any potential problems. Depending on the type of waste workers, you may elect to conduct the survey either in the communities they live in or where they work, e.g. the landfill. Reconnaissance within the communities as well as the work sites is necessary to ensure that the maximum number of waste workers is surveyed.

Step 3. Analyze and document the results of the survey

Once the survey is completed, the data must be entered into data analysis software, such as MS Excel, that can be used to analyze the results. Responses to the open ended questions will have to be coded into meaningful categories, to facilitate analysis. Other than descriptive statistics, some other statistical tests may be conducted, depending on the nature of the data collected. At a minimum, the results should answer the following basic questions:

- How many people will be affected? What is the average age and gender distribution of the population affected?
- How many people in each category of waste work type will be affected? What is the average age and gender distribution of people within these waste work categories?
- What are the different skills that the people affected have, other than waste work? How do these skills differ by age and gender within the population affected?
- What is the percentage of children involved in waste work among the surveyed population? What percentage of these children attends school? How do these differ by gender among children? Are there children who are particularly vulnerable to returning to work because of reductions in family income?
- What is the average household income? How does it vary according to waste work category?
- What are some of the indirect effects on those whom waste collectors sell their waste to, e.g. junk dealers and the waste separators whom they employ?

Step 4. Develop a plan for inclusion and/or rehabilitation of informal sector waste workers affected by the project

Based on the results of the survey, a plan for inclusion and/or rehabilitation must be put into place. To do this, a sense of the future operations of the new waste management system being implemented is required. Some questions that will need to be answered are:

- Will the project need new employees? If so, do they need to possess a particular skill set? If they do need to have a certain skill set, can a portion of the existing population affected be trained in those skills? How many of the existing informal sector waste workers affected by the new system can be employed?
- Will the project control access to waste as well as waste separation spaces? Can the rights to waste be given to the informal sector? Can access to the waste separation space be guaranteed to them?
- How many people will the project displace, by not being able to either absorb them into the workforce or by not allowing them access to waste and waste separation spaces?
- Based on the results of the survey, are you able to identify skills that the displaced waste workers already have? Can you help these workers secure jobs with those skills? If no skills are identifiable, what types of skills training does the project plan to provide them? How do you know these skills are marketable and the displaced population is willing and able to acquire these skills?

CHINTAN
ENVIRONMENTAL RESEARCH
AND ACTION GROUP

Chintan Environmental Research and Action Group
238, Sidhartha Enclave, New Delhi - 110014, India
Email: info@chintan-india.org
Phone: +91-11-46574171 or 46574172
Website: www.chintan-india.org

Appendix B

A Guide to Assessing Customer Satisfaction

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About Chintan

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Authors

Bharati Chaturvedi and Aman Luthra

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238, Sidhartha Enclave, New Delhi - 110014
India Email: info@chintan-india.org
Phone: +91-11-46574171 or 46574172
Website: www.chintan-india.org

Introduction

Cities worldwide are struggling with increasing quantities of waste. Efficient and appropriate waste management practices are becoming critical by-products of growth. In developing countries like India, both the quality of service delivery and ensuring the satisfaction of diverse and multiple stakeholders are an increasingly important part of the waste management process.

With waste more visible now than ever, citizens have started to raise their voices in a call to action. As cities try to modernize their waste management systems, it is common practice to outsource waste management services to private companies. In response, informal sector waste workers in cities across the country are organizing and asking to be included in current and proposed urban waste management programs and policies. Regardless of who provides this service, it is important to assess how consumers of these services feel about the quality of service. Along with better management of services and growth of the organization, information on customer satisfaction helps to keep the consumer involved and helps to develop a participatory model that can improve all aspects of the services provided.

There are many ways to measure and document customer satisfaction, such as surveys, tracking customer complaints, and soliciting regular feedback through formal and informal means. Customer satisfaction surveys can provide a comprehensive view of all aspects of the service being offered, across the population of consumers, through a structured sampling strategy.

The following sections provide guidance on how to conduct a customer satisfaction survey, to determine the objectives it needs to fulfill, to establish the scope of such a project, and to analyze and use the survey results. It also outlines the basics of how to create a survey and provides some sample questions. This document serves as a starting point for project owners to develop their own customer satisfaction survey instrument and process.

Customer Satisfaction Assessment Process

This section outlines a high-level process for conducting a customer satisfaction survey of waste management systems implementation. Ideally, such a survey should be conducted no earlier than six months after the start of a project. Six months after a project's inception should be adequate time to resolve any initial problems and ensure that service delivery is running smoothly. The process of customer satisfaction assessment should, at a minimum, consider the following steps.

Step 1. Understand and document the objective and scope of the survey

As a first step in this process, one needs to understand and document the objectives of the survey. This should answer the simple question: What do I want to measure through this survey? The design of the survey instrument should be guided by the resulting objectives. A geographical area and/or target respondents could limit the scope of the survey. For instance, it may be decided to conduct the survey in four specific wards of the area in which services are provide, because they are high profile. In addition, it may be decided that the survey should include not only households but also sanitary inspectors and municipal sweepers. The reasons for narrowing the scope of the survey should be clearly documented and justified. Examples of survey objectives could include:

- Understand how customers rate the quality of service;
- Understand what problems customers face with the service;
- Understand what can be done to improve the levels of service; and
- Understand if customers might be willing to pay more for improved service.

The survey questions must be designed to meet the pre-determined objectives. Objectives will also help to determine what kind of questions to ask. Should they be yes/no or multiple-choice questions, or should they be open-ended questions? Typically, the former can tell you "what" the respondents feel, and open-ended questions can tell you "why" respondents feel the way they do.

Step 2. Survey instrument

At a minimum, the survey instrument should contain the following information:

- Informed consent and authorization: a statement of purpose of why the survey is being conducted, provision of guarantee of the respondent's confidentiality, contact information of the organization conducting the survey, and agreement of the respondent's voluntary participation in the survey.
- Information about the respondent: demographic information, such as age, gender, size of the household, geographic location, socio-economic classification, etc. These work as class variables to understand response patterns.
- Survey questions: As discussed previously, the survey instrument should be designed based on the objectives and scope of the survey. Some examples of survey questions for a door-to-door collection program, for instance, are:
    - Is the service provided on time? [1 = Strongly disagree, and 5 = Strongly agree]
    - Are service providers professional, courteous, and respectful? [1 = Strongly disagree, and 5 = Strongly agree]

    - Are complaints handled in a timely manner? [1 = Strongly disagree, and 5 = Strongly agree]
    - Has there been an overall improvement in waste management since the project started? [1 = Strongly disagree, and 5 = Strongly agree]
    - How would you rate the overall level of service provided [1 = Very poor, and 5 = Very good]
    - Briefly describe the one thing you like best about our service.
    - Briefly describe the one thing you don't like about our service.
    - Please suggest the top three ways for us to improve service in your area
- At the end of the survey, include a question that asks whether the respondent is interested in receiving the results of the survey. If so, ask their preferred method by which they would like to receive the results (e.g., by email or mail), to provide the respective contact information, and then establish a method to follow-up and send a copy of the survey results.

Step 3. Sampling strategy and conducting the survey

Once the objectives and scope have been defined, and the respective survey instrument design is determined, a sampling strategy needs to be identified. Following are some considerations to keep in mind when designing a sampling strategy:

- What is the population size? How large should the sample be in order for the survey results to be applicable to the entire population?
- What sampling technique should be used? Two examples are simple random sampling and stratified random sampling.
    - In simple random sampling, one needs to know the total number of households, and then randomly select the required number of households from that sample.
    - In stratified random sampling, an additional variable will be used to stratify the survey area, from which potential respondents will be randomly selected. For instance, if it is decided the geographic spread of the population is important, then either the existing administrative boundaries (such as North, East and South, New Delhi and Delhi Cantonment in the case of Delhi) can be used, or if such boundaries are not available, and no administrative units within the survey area corresponds to these units, the area could be manually mapped into quadrants and randomly sample within them.
- Regardless of the sampling strategy, it is very important to justify and document the specific choices.

Once the sampling strategy has been defined and the survey instrument is designed, it is time to conduct the survey. For best results, the following basic steps should be followed:

- Train the surveyors. It is very important that surveyors understand the objectives of the survey, the survey instrument itself, and the process involved in conducting the survey.
- Pilot test the survey. Begin with a small sampling of respondents to see if the instrument is comprehensible to them or if any of the questions need to be changed to get more accurate responses. This is also an opportunity to test the sampling strategy to make sure it works for meet the particular objectives or if it needs to be changed.
- Monitor the survey. Ideally, a neutral third party observer should conduct spot checks as the survey is being conducted. This will ensure the quality of the survey and its results.

Step 4. Analyzing and reporting the results

Once the survey is completed, it is important to ensure accurate data entry. Data quality can be monitored by randomly selecting a few surveys and checking them against the data to check accuracy and quality. Systematic errors in data entry can be discerned by manually checking the data to see if data for one question on the survey might have been wrongly entered in another question.

Once data entry is complete, it's time to analyze the results. Use standard quantitative and qualitative (if available) data analysis methods. Make sure customer information is used to understand response patterns. These could be crucial to target program improvements. The report of the findings should contain information from all five steps of the process: objectives and scope, survey instrument, sampling strategy, survey process, and survey results. At the end of the process, have a discussion about what the results mean in terms of the current quality of service, areas of improvement, and how to address them.

Chintan Environmental Research and Action Group
238, Sidhartha Enclave, New Delhi - 110014, India
Email: info@chintan-india.org
Phone: +91-11-46574171 or 46574172
Website: www.chintan-india.org

Appendix C

A Guide to Estimating the Number of Workers in the Informal Sector Waste Economy

CHINTAN
ENVIRONMENTAL RESEARCH
AND ACTION GROUP

About Chintan

Chintan is a registered non-profit organization that promotes equitable, inclusive, and sustainable growth for all. Its mission is to reduce ecological footprints and increase environmental justice through systemic change via partnerships, grassroots capacity building, advocacy and research, and sustainable, scalable models on the ground.

Authors

Bharati Chaturvedi, Aman Luthra and Aiden Short

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238, Sidhartha Enclave, New Delhi - 110014
India Email: info@chintan-india.org
Phone: +91-11-46574171 or 46574172
Website: www.chintan-india.org

Introduction

Conducting an assessment on the impacts of a waste management project on informal sector workers in the waste economy can be an intensive process required time and financial resources. In the absence of such resources, we have devised a simple method for estimating the number of informal sector workers potentially impacted by a project. The data used for these estimates comes from Chintan's experience working in Delhi and documentation published by the Government of NCT of Delhi. Other cities are likely to be different therefore we recommend that these equations and assumptions be tailored to fit the specific experience of the city in which the project is implemented.

Estimation Method

This method estimates the number of workers impacted based on the waste management service being provided by the project.

Collection and Transportation Services

Collection and transportation services could be of the following two types: (A) door-to-door collection and direct transportation to treatment/disposal facility; and (B) collection from dhalaos or community bins and transportation to treatment/disposal facility.

Type (A) services could be provided in areas where there are existing dhalaos or community bins or in those areas where no such bins exist. If no bins exist, then the number of existing informal sector door-to-door collection workers can be estimated by using a simple formula. For this estimation, one will need to know the number of households the collection service is being provided to. In Chintan's experience, we have found that informal sector door-to-door collectors typically service 120 households. Therefore, the formula to calculate the number of informal sector door-to-door collectors impacted by this service is:

$$N_{\text{impacted wastepickers (D2D)}} = N_{\text{Households}} / 120 \qquad \text{(Equation 1)}$$

If type (A) services are being provided in an area where dhalaos or community bins exist, then we also need to estimate the number of waste pickers who typically pick waste from the dhalao. In Chintan's experience, we have found on average that 2 waste pickers work at a dhalao or a community bin. Dhalaos are concrete structures used for temporarily storing waste that are in many cases being replaced by 3 to 4 cubic meter sized bins. Regardless of the structure of the dhalao (which may now have 2 or 3 bins), the space and the waste materials in it supports approximately 2 wastepickers. If you

know the number of dhalaos or community bins in the area that service is being provided to, then use the following simple formula to estimate the number of waste pickers impacted due to the obsolescence of community bins or dhalaos:

$$N_{\text{Impacted waste pickers (dhalao/community bins)}} = N_{\text{Dhalao/community bins}} * 2 \qquad \text{(Equation 2)}$$

If you do not know the number of dhalaos and community bins in your area, then you can use the following formula for estimating the number of dhalaos or community bins. To start with, we again need the total number of households that the service is being provided to. According to the *Master Plan for Delhi 2021*, each dhalao (200 square meters in area) should serve a neighborhood of approximately 10,000 residents (equaling approximately 2500 households). So, the number of dhalaos or community bins impacted by the collection and transportation service can be estimated as follows:

$$N_{\text{Dhalao/community bins}} = N_{\text{Households}} / 2500 \qquad \text{(Equation 3)}$$

If type (B) services are being provided, use equations 2 and 3 to estimate the number of waste picker impacted.

To calculate the number of small junk dealers impacted by the collection and transportation service, one can use the following simple formula. In Chintan's experience, we have found that typically each small junk dealer buys waste from approximately 6 waste pickers. Using the number of waste pickers derived from equations 1 or 2 above, the following formula can be used to estimate the number of small junk dealers impacted:

$$N_{\text{Junk dealers}} = N_{\text{Wastepickers}} / 6 \qquad \text{(Equation 4)}$$

The total number of informal sector waste workers impacted by the project is a sum of the waste pickers and junk dealers impacted:

$$N_{\text{Impacted informal sector workers}} = N_{\text{Wastepickers}} + N_{\text{Junk dealers}} \qquad \text{(Equation 5)}$$

Segregation and Recycling Services

To estimate the number of waste pickers impacted by segregation and recycling services, you will need data on the amount of dry waste segregated and recycled at the facility. This formula assumes that a waste picker segregating waste in a godown is typically able to segregate approximately 200 kg of dry waste per day. This assumption is based on Chintan's experience. Using the total amount of dry waste per day

segregated and recycled as part of this project, the following formula can be used to estimate the number of waste pickers impacted:

$$N_{\text{impacted wastepickers}} = A_{\text{Dry waste per day}} / 200 \qquad \text{(Equation 6)}$$

Equations 5 and 6 can then be used to estimate the number of junk dealers and total informal sector workers impacted by this service.

Waste-to-Energy Services

To estimate the impact of this service, we make the assumption that waste that would ordinarily have been deposited at the landfill is now being fed to the waste-to-energy plant. In our research, we have seen that a landfill receiving 1300 tons of waste per day could support the livelihoods of 450 waste pickers. In addition, we know that typically a waste picker is able to collect about 60 kgs of dry waste per day from the landfill. Consequently, we estimate that the resource efficiency at the landfill is about 2 percent. Research by the Municipal Corporation of Delhi shows that landfill waste contains about 9 percent dry recyclable waste. The reason that waste pickers at the landfill are not able to salvage a greater percentage is due to the way the waste is deposited at the landfill. But MCD research also shows that our estimate of 2 percent recycling from landfill waste is likely very close to actuals. Based on these assumptions, we have devised the following formula for estimating the number of waste pickers impacted. For this calculation, you will need the total amount of waste (in kgs/day) fed to the waste-to-energy plant:

$$N_{\text{impacted wastepickers}} = A_{\text{Waste (kgs/day)}} * 0.02 / 60 \qquad \text{(Equation 7)}$$

Once again, equations 5 and 6 can then be used to estimate the number of junk dealers and total informal sector workers impacted by this service.

Landfill O&M and Upgrading Services

To calculate the number of waste pickers and junk dealers impacted by this service, use equations 7, and then 5 and 6.

Landfill Closure Services

To calculate the number of waste pickers and junk dealers impacted by this service, use equations 7, and then 5 and 6.

Assumptions

The specific structure of the informal sector waste economy is likely to vary across cities, and across income groups to whom waste management services are being provided. This document provides a simple method for estimating the number of informal sector workers impacted by the waste management services. Our assumptions are based on over 10 years of field experience working with the informal sector waste picker community in Delhi as well as existing research on these issues. These are listed in the reference section below. We have relied on the following assumptions in developing the formulas for estimation:

- A typical waste picker engaged in door-to-door collection collects waste from an approximately 120 households.
- Two waste pickers collect waste from a dhalao or a community bin, on average.
- Dhalaos or community bins serve approximately 2500 households in a city.
- A small junk dealer buys recyclables from approximately 6 waste pickers.
- Waste pickers segregate approximately 200 kgs of dry waste per day, on average.
- Waste pickers at a landfill collect approximately 2 percent of the total waste entering the landfill.
- Waste pickers at a landfill collect approximately 60 kg of recyclables each day per person.

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