The Report committee for Samantha Kattan

Certifies that this is the approved version of the following report:

# Reworking Municipal Composting:

## Expanding Support for Trash Workers

## in Mexico City's Composting Program

**APPROVED BY**

**SUPERVISING COMMITTEE:**

_____

**Supervisor: Bjørn Sletto**

_____

**Barbara Brown Wilson**

# Reworking Municipal Composting:

## Expanding Support for Trash Workers

## in Mexico City's Composting Program

**By**

**Samantha Kattan, B.A.**

Report

Presented to the Faculty of the Graduate School

Of the University of Texas at Austin

In Partial Fulfillment

Of the Requirements

For the Degree of

**Master of Science in Community and Regional Planning**

The University of Texas at Austin

August 2014

# Reworking Municipal Composting:

# Expanding Support for Trash Workers

# in Mexico City's Composting Program

Samantha Kattan, MSCRP

The University of Texas at Austin, 2014

SUPERVISOR: Bjørn Sletto

**Abstract**

As municipalities in the developing world are struggling to deal with the ever-increasing rate of residential trash generation, many have embraced the practice of diverting organic waste to composting plants. However, because most models for implanting new Solid Waste Management (SWM) programs have emerged from the experiences of municipalities in the industrialized world, they often gloss over the particular social, cultural and economic contexts that make SWM programming particularly challenging in the developing world. In Mexico City, the absence of curbside collection, and a trash workforce comprised of both formal and informal trash collectors, have created unique challenges for the municipality's composting program that was initiated in 2004. This report attempts to highlight that the limited success of the program thus far might be rooted in the program's design, which has largely ignored the needs of the trash workers who are largely held responsible for its implementation.

**TABLE OF CONTENTS**

## LIST OF TABLES



## LIST OF FIGURES

## CHAPTER ONE: Introduction

As Mexico City and other rapidly growing cities around the world are struggling to cope with the environmental and economic costs associated with rapid increases in landfill waste, composting programs have emerged as a viable and economical element of municipal Solid Waste Management (SWM). At large-scale composting facilities, organic material, including food scraps and yard trimmings, can be processed and turned into nutrient-dense fertilizer to be sold for agricultural use or used within the city's green spaces, thus saving the municipality money on chemical fertilizer. In addition, because organic waste tends to weigh more than inorganic material, reducing its presence in trash trucks and trailers heading to landfills can result in significant gas savings for cash-strapped municipalities.

Composting is a particularly promising solution to the organic solid waste problem in developing countries, which generally have a higher proportion of organic waste material than developed countries. It is also a very flexible form of waste stream diversion, since composting can take place at the household level in backyard bins, at the community level, or at an industrial, municipality-wide level, depending on the local desires and ability to invest in technology. However, there are important challenges to implementing municipality-wide composting programs in mega-cities such as Mexico City. SWM systems in general are difficult to change because they are large and complex, often involving several city agencies and private companies. Adjustments to the structures of

such complex SWM systems often require a change in resident consciousness and behavior related to the waste they produce.

Mexico City represents a particularly challenging context for such SWM reform. It is the largest city in the Americas, with a population of 8.9 million, and over 20 million in its metropolitan area. Even though the city's population has remained steady over in the last 30 years, it is still scarred by the explosive growth in the mid-20$^{th}$ century that led to the development of large swaths of peri-urban informal settlements.

Residents of this sprawling city generate 12,740 tons of waste every day, the majority of which ends up in landfills (SMA, 2012). Without curbside trash collection, most parts of the city rely on daily pick-up from over 2,500 trash trucks that meander through the streets and stop every few blocks to allow residents to walk their trash directly to the truck. This is how trash has been collected in Mexico City since it started a formal SWM program in the 1960s, and its governing body has no plans to change it.

Ten years ago, however, Mayor Andrés Manuel Lopez Obrador released an Integrated Solid Waste Management Law that contained a surprisingly progressive component: mandatory separation of organic waste at the household level so it can be composted and used as fertilizer in green spaces around the city. Although several Latin American cities have composting facilities that process agricultural waste or scraps from food markets, none have established residential programs that require trash separation at the household

level. Even in the US, only a handful of cities have attempted mandatory municipal composting programs for residents -- including Portland, San Francisco, Seattle, and Boulder – and a few more are currently implementing pilot programs.

Mexico City's implementation of a composting program represents a particular milestone in the municipality's SWM and environmental education: it has been paired with the municipality's first large-scale effort to change the way residents understand and dispose of their trash. This is because the city has no residential recycling program for inorganic material, which means that residents have not been introduced to the idea that there is a difference between the different kinds of trash that they take to trash trucks. Instead, trash workers and informal waste pickers have historically done the work of separating and sorting inorganic material -- such as paper, glass, and aluminum – to divert to recycling plants.

Formalized recycling, and an associated environmental education campaign, is coming down the pipeline, however. The city's Environment Ministry, the *Secretaría del Medio Ambiente* (SMA), does have plans to roll out a campaign in the next five years that asks residents to separate not only their organic trash, but to sort their inorganic recyclables as well. The Environment Ministry hopes that this future campaign focused on separating recyclables "at the source," instead of relying on trash workers to separate at the truck, will increase the catch rate of recyclable material and further reduce the material that ends up in landfills. Because the municipality already has a network of recycling facilities

in place, the future recycling campaign will require a behavior change for residents without requiring new municipal infrastructure. Thus, its success will be almost entirely dependent on the effectiveness of its associated outreach campaign to drum up resident participation. The education department of the Environment Ministry has already started considering options for how to conduct the recycling outreach, informed by the challenges and successes of the composting program.

The complex administrative and operational structure of Mexico City's vast SWM system makes it difficult to navigate for research purposes, and because its workforce is half-formal, half-informal workforce (about 50% of trash collectors are not formally employed by the municipality), it is difficult to gather comprehensive and accurate information about collection programs and policies. This is compounded by the fact that government entities in Mexico are often seen with suspicion and distrust. A distinct lack of public participation in policy decisions means residents, and even trash workers themselves, are poorly informed of new programs and policies that affect their daily lives. As Mexico City pushes for more SWM reforms that require resident participation, the SMA will need to consider new tactics for engaging with the public and its own workforce, in ways that will strengthen participation in its programs while supporting the

As I conducted my field research into this complex SWM system to better understand the goals and implications of the composting program, I was guided by this central research question: How can the SMA leverage the unique position of municipal trash workers to

increase resident participation in current and future SWM programs? To answer this question, I needed to find out how the municipal trash workers engage with residents, and how the SMA and composting program administrators currently perceive and support the role that the trash workers play in implementing the program.

This led me to develop a research design that combined observations of and interviews with several trash workers in the *delegación* Azcapotzalco (an administrative unit similar to boroughs in New York City) in northwestern Mexico City with interviews with administrators of the composting program and its related educational outreach programs. Because each *delegación* operates fairly independently, with different budgets and administrative structures, it would be a huge undertaking to produce a report that fairly represents the entire city. I have focused on the *delegación* of Azcapotzalco because it is has socioeconomic indicators and land use patterns that are in line with the municipality as a whole (Asamblea Legislativa, 2006). In contrast, some *delegaciónes* include large areas of agricultural use (Milpa Alta, Coyoacan), or have much higher than average median household incomes (Cuauhtemóc), making it difficult to extrapolate general trends from their trash management practices and their experiences with the compost program.

In terms of my interviews with administrators, in May 2014 I spoke with three administrators from the SMA, as well as the Cleaning Supervisor in Azcapotzalco. I wanted to get the perspective of the direct administrators of the program at the *delegación*

level – the office of the Cleaning Supervisor is located adjacent to the waste transfer station in Azcapotzalco – as well as the more removed role of the SMA workers, who create outreach materials about the program for the entire municipality.

To obtain interviews with trash workers, I conducted initial research in the summer of 2013 when I observed how trash collection works in residential areas, as well as what happens around the transfer station in Azcapotzalco. I spent three afternoons following one route and speaking informally with the workers, and I visited the waste transfer station twice, where truck workers and street sweepers congregate to drop off their loads, leave their trucks or street carts, and wash up. I spent about four hours at the transfer station, speaking informally with truck workers, street sweepers, and the security guards at the entrance to the station. I then returned in May 2014 to conduct and record four interviews with workers at the waste transfer station in the afternoons.

To ensure I covered all the topics I needed, I conducted semi-structured interviews with all my subjects. Before meeting with each interviewee, I wrote a list of 8-10 open-ended questions that were relevant to their position in relation to the compost program. For my interviews with the city administrators, they requested that I share my interview questions with them via email before our meeting. At the beginning of each interview, I explained that my written questions are only a guideline and that I may ask other questions that were not written down. All of my interviews, including those with city administrators, deviated from my written questions and felt fairly organic and conversational.

I also reviewed a variety of printed material from the Environment Ministry, including the entire Solid Waste Law from 2003, examples from the citywide and Azcapotzalco-specific outreach material about the compost program, an educator's booklet for trash-related curricula at primary schools, and an official SMA PowerPoint presentation that is used at meetings with schools and civic groups. Another important source of information was *The Society of Trash*, a well-known ethnography of the trash system in Mexico City (Berthier: 1983). In it, the author includes both qualitative and quantitative data about the city's SWM system, as well as explanations of the limitations, and at times deliberate omissions, of data that the various agencies release about trash and trash workers. Together, this printed material gave me a solid understanding of not only the structure and history of the compost program and SWM in Mexico City, but also of the language the municipality uses when presenting its work to civic groups, institutions, and researchers.

My interviews with program administrators and trash workers provided valuable insight into the development, administrative structure and operations of the compost program, which often contrasted with the daily lived experience of the trash collectors who are implementing the program. All four administrators I spoke with had a lot of information to share about how their division prepared training manuals and educational programs for residents, but they were less familiar with the training that was provided to the trash workers as the daily representatives of the program.

With my prompting, my administrator interview subjects acknowledged that trash collectors play an important role in ensuring the success of the compost program. However, they mostly focused on the fact that the workers physically separate the trash if residents don't do it well, and they did not acknowledge the social nature of collectors' work. The trash workers themselves frequently spoke of social interactions with coworkers and residents, as well as their frequent need to verbally remind residents to separate their trash for composting. Using this insight, I will recommend several intervention points that could leverage the social role of trash collectors to creatively strengthen participation in the current compost program, contribute to a successful roll-out of the city's upcoming recycling campaign, and amplify the visibility of the important and multi-faceted work that the collectors do.

With this report, I would like to illustrate the challenges that complicate the crucial role that trash collectors play in Mexico City's residential composting program, arguing that their unique daily interface with residents could be leveraged to increase participation in the city's current compost program and upcoming recycling campaign. While the SMA seems to understand completely that face-to-face interaction is key to communicating policy changes to residents, it has historically emphasized making direct contact with residents rather than exploring the potential for formally trained trash workers to efficiently spread information as well. I hope that this report can spark creative thinking about how to leverage the position of trash workers to strengthen communication about

the compost program, and waste management in general.

I have structured my report as follows. The first chapter presents a review of literature about SWM models in industrialized and developing countries, with a particular focus on guidelines for incorporating social considerations into feasibility studies for SWM programming. Chapter three describes the SWM system in Mexico City, focusing particularly on the work of the trash collectors. Chapter four covers the roll-out of the composting program, with a particular focus on the language in the Solid Waste Law and accompanying Program Guidelines. It also explores the role that trash workers have played and the challenges they face in implementing the program, drawing on the information I gathered in interviews and through personal observations. Chapter five presents a brief summary discussion, which will lead to a series of recommendations for how the integrated SWM system in Mexico City could better leverage the unique social role of trash collectors to increase the success of its composting program.

## CHAPTER TWO: Towards Zero-Waste Urbanism in the Developing World

Adequate management of municipal solid waste management is a serious environmental and social challenge to cities world-wide. As the world population grows relatively wealthier and more urban, the amount of trash generated is increasing rapidly, outpacing municipal efforts to reduce landfill waste. This is also the case in Latin America, despite the relatively low average incomes in the region. Latin American urban residents produce 225,000 tons of solid waste every day, a number that does not even include the waste from the 20% of residents who live in rural areas with no formal collection (USAID, 2014).

It is now common practice for large cities in developing countries to have some form of formalized SWM system via curbside trash collection and transportation to official disposal sites. However, most cities do not include any steps to divert trash before it reaches landfills. In regions with recycling facilities for glass, plastic and metal there usually exists an informal network of trash workers who separate out recyclables to sell, but municipalities are generally unable or unwilling to pay waste pickers a salary for this work (Gutberlet, 2008). In this chapter, I will describe the challenges faced by municipalities in the Global South as they develop SWM systems, and then I will discuss the opportunities and challenges of trash diversion, focusing in particular on composting.

**Integrated SWM systems in developing countries**

Some municipalities in the developing world are starting to recognize that simply providing waste collection and disposal isn't a sufficient answer to the waste problem, and are instead exploring ways to offer "Integrated Solid Waste Management" to their residents. Integrated SWM is the idea that a municipal trash system should include a diversity of opportunities to divert and manage waste beyond landfill disposal. This might include the formalization of informal recycling activities, the development of a composting program, or the investment in technology to harness methane gas for energy. A municipality that practices Integrated SWM will explore how to "prevent, recycle and manage solid waste in ways that most effectively protect human health and the environment" (EPA, 2002). Extensive research has been conducted into optimal practices for Integrated SWM, but here I will draw on the US Environmental Protection Agency's (EPA) "Waste Management Hierarchy," which ranks the various elements of Integrated SWM in the following order from most to least preferred: Source reduction and reuse, recycling/composting, energy recovery, and treatment/disposal (EPA, 2002).

Within the diversity of options available for furthering source reduction, composting has emerged as a preferred method of diverting waste within Integrated SWM in developing countries. Composting can potentially have a large impact on the amount of waste that ends up in landfills, because developing countries tend to have a higher proportion of

organic waste that can be composted than industrialized countries. In Latin America, organics make up 40-50% of the waste stream – meaning up to half of the trash in landfills could have been diverted and composted – while only about a quarter of the waste stream in the US is organic (Hoornweg, 1999). Composting is also particularly relevant in developing countries because it can be conducted in very low-tech and low-cost ways, making it ideal for rural areas or small municipalities with little money to invest in new technology (Schübeler, 1996).

There are three scales at which composting initiatives can operate: at the household level, at the community level, and at the municipality level (Hoornweg, 1999). At the household level, residents use bins to convert their own organic waste into compost, either outdoors or in sealed containers indoors. Community-wide composting is usually run by NGOs or the communities themselves, and typically relies on low-cost, low-tech methods of speeding up the composting process (for example: using worms or heating). At the municipality level, composting facilities are generally more technologically advanced to allow for the composting of a wider variety of materials, including animal carcasses.

Because many cities in developing countries struggle to develop and maintain basic waste collection and disposal systems, the investment and coordination required to launch a municipality-wide composting program is generally only possible for larger cities in countries that are at least middle-income. In addition, the viability of municipality-wide

composting initiatives depends on the steady availability of well-separated organic waste material and a market to sell the final product to. This means that a high level of participation in the program is required of residents, in addition to strong institutional relationships to handle the marketing of the compost. Often the municipality will work with nearby agricultural institutions to sell their product, or use it to fertilize green spaces within the city (Schübeler, 1996).

However, despite the technical and economic challenges of implementing municipal composting program, the social dimensions of composting may be a more significant, and overlooked, obstacle. SWM guidelines developed by international development agencies, such as USAID and the UN, generally downplay the social aspects of implementing a new large-scale program such as municipal composting. Morrissey's (2003) overview of SWM models documents the movement since the 1970s towards Integrated SWM and Sustainable SWM, as well as the increasing attention municipalities around the world are paying to waste diversion methods. But he found that advanced SWM models from industrialized countries tend to ignore social aspects of waste management. When social elements are included in decision-making guides for administrators, they focus only on issues of NIMBYism ("Not In My Backyard") and social compatibility in terms of site selection for waste management processes. He concludes his report with the recommendation for future research to develop a decision-making framework, and evaluation criteria, for SWM planning that involves all relevant stakeholders (Morrissey, 2003).

Furthermore, SWM models that do include frameworks for ensuring social compatibility often assume cultural and political contexts that are specific to industrialized countries. These models are problematic because they do not provide guidance for many of the largest issues that municipalities might face when implementing new SWM programming. In particular, Joos et al. (1999) suggest that SWM programs are more likely to be successful if they are based on the following principles: accessibility of information, transparency of decision-making and decision-execution; assurance of participation rights for the affected public; conflict resolution methods for when individual and collective interests are in conflict; and the just availability of basic life opportunities for all, including work, recreation, risk avoidance, and food/water/warmth.

However, since decision-makers in the developing world have long relied on data, cultural assumptions, and technology imported from industrialized countries, they struggle to adapt what they see working well in other countries to their cities. This is in part because of a number of social, political and economic limitations that hamper effective governance. In particular, two principal challenges that developing countries face to a greater extent than industrialized countries are the presence of an informal trash workforce and low institutional capacity of SWM management.

For many municipalities in developing countries, the labor of separating recyclable material is primarily provided by waste pickers (or *catadores*) who are not formally

employed by the city. They make a living by sorting through trash on the street or at landfills and selling what they separate to recycling facilities or to middlemen, who pay them by the weight of material they have collected. Waste picking is the result of various factors including the absence of formal recycling programs, limited economic opportunity in urban areas, and the inability or unwillingness of municipal governments to pay for waste separation services. It is estimated that over 500,000 people in Latin America make their livelihood as informal trash workers (Gutberlet, 2008).

Although waste picking provides a crucial source of income for thousands of residents who have limited access to the formal job market, the presence of informal workers creates a variety of challenges for municipalities. Because informal waste pickers are not paid, and generally not tracked or regulated by SWM administrators, they are free to work however and whenever they choose, without needing to report to the municipality. This autonomy complicates the communication between SWM administrators and the people who handle the trash being managed, which then makes difficult any widespread policy changes that require cooperation from the trash workforce. In addition, the process of measuring waste generation and diversion becomes more challenging, which in turns makes accurate program evaluations difficult to conduct (Gutberlet, 2008).

In addition to the challenge posed by the informal waste picking sector, city agencies tasked with handling SWM are often under-staffed and lack the technical skills and financial knowledge to operate efficiently while implementing new programs (Hoornweg,

1999). Many municipalities, especially those that have seen rapid population growth in recent decades, struggle to offer even basic collection services for all their residents. Their main challenge is to improve and expand their collection service, and they typically do not have the capacity to divert enough funds or staff power to new programming, even if they desire to implement new programs such as composting. In addition, the marketing campaigns that accompany new programs are often inconsistently applied or do not communicate their message clearly, because the city agency or the marketing firm hired to handle outreach might not have a background in the nuances of environmental communication strategy (USAID, 2014).

Municipal composting is one example of an Integrated SWM program that presents significant challenges in the developing world. In Latin America, over 30 industrial-scale composting plants have been purchased since the 1980s, but most are in disuse. In Mexico, 21 of the 60 the composting plants (of various capacities ranging from 1-2 daily tons to 3,000 tons in Mexico City) that have been constructed since the 1980s have closed or never operated at all (UNEP, 2005). The high failure rate of municipal composting is primarily due to municipalities failing to conduct adequate feasibility studies before building their facilities. This leads to a lack of participation, a lack of a market for the final product, and thus a prohibitively high operating cost for the facilities.

Another factor contributing to the low success rate of municipal composting programs might be the lack of social feasibility studies prior to implementation: because most

SWM models do not explicitly consider social context an important element of SWM programming, they also fail to consider lack of social/cultural sensitivity as a potential contributor to an unsuccessful program. For example, a report from the World Bank Urban Development Division, "Composting and its Applicability in Developing Countries" offers a list of 10 recommended steps for a municipality to take before attempting a centralized composting scheme; other than a mention of a marketing strategy, none of the recommendations focus on the need for an assessment of social/cultural contexts before implementing a composting program (Hoornweg, 1999).

**Integrating Social Assessments into Solid Waste Management**

However, despite the general lack of attention to social dimensions of composting in the most prominent models and literature, guidelines and best practices have been developed for ensuring that SWM programming is sensitive to a municipality's social, cultural and political context. One such set of guidelines developed by the World Bank Urban Thematic Group places particular emphasis on methods of incorporating stakeholder input into SWM planning in general (Bernstein, 2004). It asserts that effective SWM planning must consider local cultural contexts, which can be gleaned through public participation, in addition to the technical and economic elements that are typically incorporated into feasibility studies for SWM projects in developing countries. The paper highlights "Five Entry Points of Inquiry of Social Assessment," as follows:

Social Diversity and Gender: This first consideration includes poverty, affordability and willingness to pay, gender, age, ethnicity, and other demographic characteristics, as well as the health and safety of especially vulnerable groups. For example, considering gender might influence decisions about when and where trash is collected, or allow policymakers to plan for the gendered results of new programming. One example is that many informal waste pickers are female but their share drops dramatically when municipalities formalize the practice (Gutberlet, 2008). By conducting an assessment of gender, institutions, rules and behaviors, and relevant stakeholders, policymakers are better able to craft a participation plan that achieves the project's overall mission while minimizing negative outcomes.

Institutions governing SWM: An assessment of institutions will include the relationships between institutions and organizations that manage SWM systems. It will investigate the feasibility and sustainability of a proposed program through the lens of the formal and informal groups that shape the implementation of SWM programming. These can include city agencies, community groups, and NGOs.

Rules and Behaviors: An assessment of the norms, values, and behaviors associated with trash might reveal biases that will inhibit or support a new SWM program. Trash workers, particularly in developing countries where they often have direct interaction with the residents they serve, have particular insight into the rules and behaviors

surrounding trash.

Stakeholders: This point of inquiry is for program administrators to consider the entire spectrum of stakeholder groups who should be at the planning table before implementing a new SWM program. Beyond the standard players of political actors and city officials, a holistic SWM system will also incorporate input from vulnerable groups, the recycling industry, educational institutions, and trash workers.

Participation: The authors of the paper assert that participation beyond the standard community meetings is crucial. They assert that the deliberate inclusion of vulnerable groups will produce unexpected insight into the ways a new SWM can positively or negatively impact these groups.

Social Risk: An assessment of the health and safety risks, to residents in general and specifically to trash workers, can influence the design of a new SWM program. This assessment should go beyond "NIMBY" considerations to plan for mitigation measures in case displacement or increasing an area's proximity to hazardous land use (such as waste transfer stations) is a necessary part of the program. A potential risk for trash workers as a result of a new composting program is their increased need to directly handle wet organic waste, which has a higher probability of containing toxic pathogens than inorganic waste.

Although trash workers are not explicitly considered, they appear in nearly every facet of social assessments. Their low pay means they form part of an urban area's most economically vulnerable residents, they interact with and are governed by the institutions implementing the SWM programs, they both contribute to and receive the program administrators' efforts at outreach and participation, and they directly handle the waste that is being managed. They should clearly be considered key stakeholders in the planning of new SWM programs, and could potentially be considered the key "users" of a SWM program.

The rest of this report will describe the SWM system in Mexico City and explore, in particular, how the trash workers' needs have been left out of the design of a municipal composting program, before concluding with some recommendations for the program administrators to better integrate the workers into the program. The end goal of these recommendations is to lessen the burden on the trash workers by increasing active resident participation in the composting program.

## CHAPTER THREE: Solid Waste Management (SWM) in Mexico City

Mexico City comprises 16 *delegaciones* (boroughs)– spread out over 573 square miles in the Valley of Mexico (Figure #1). The *delegaciones* vary widely in population (ranging from 186,000 in Cuajimalpa to 1.8 million in Iztapalapa), land use patterns (the south includes large swaths of nature reserves and agricultural use, while the central and northern areas are heavily developed), and socioeconomic status (the outer *delegaciónes* have high levels of poverty and informal settlement patterns).


*Figure #1: Map of Mexico City's 16 delegaciones*

Together, Mexico City's 8.9 million residents generate 12,740 tons of trash every day, or about 1.4 kg per person (SMA, 2012). Overall waste production and per capita production have been increasing steadily in recent years, while the municipality is still

struggling to recover from the explosive growth it saw in the mid-twentieth century. The city is surrounded by informal settlements, many of which lack reliable city services such as trash collection.

As a result, the municipality faces a variety of environmental issues related to its solid waste. Its water supply is contaminated with heavy metals and toxic liquids leaked from improperly dumped waste (DGEIA). In addition, due to lack of "open space" away from the city, all phases of trash collection, transportation, processing, and final disposal happen within heavily populated areas, contributing to air pollution and congestion. In addition, what also contributes to the challenge of solid waste management is the unwieldy complexity of the trash collection system, and the overlapping spheres of responsibilities and poor communication between agencies. The Environment Ministry identifies four "spheres of responsibility" in municipal Solid Waste Management (Table #1):

| **Group** | **Tasks and Responsibilities** |
|---|---|
| Residents and businesses | Separation at the Source |
| Public Works office of each *delegación* | Separated Collection<br>Trash Collection Program<br>Training |
| Municipality-wide Public Works and Urban Services agencies | Separated Transfer<br>Treatment and Reuse<br>Registration of SWM business<br>Trash Collection Program |
| Municipality-wide Environment Ministry | Integrated SWM Program<br>Creation of SWM Plans<br>Inventory of Generators<br>Training for Multipliers |

*Table #1: Spheres of Responsibility of SWM in Mexico City*

The four groups that the Environment Ministry specifies as sharing the responsibility for SWM in the city have defined roles, but they often overlap or have an unclear scope. This has created uncertainty in Azcapotzalco about whether individual *delegaciones* should provide additional training for their trash workforce, and it has enabled the creation of concurrent outreach campaigns across the municipality. These unclear elements of the administrative structure undergirding the municipality's SWM have negatively impacted the roll-out of the composting program on the ground.

**Daily Flow of Trash**

Other than the recently added work of separating organic material, the daily flow of trash in Mexico City has changed very little in the last 30 years. Hector Castillo Berthier's ethnography of trash collection in Mexico City in the early 80s described: "the typical bell of the trash truck that notifies the housewives, servants, and the neighborhood in general so that they come outside with their containers, boxes or bags of trash and they deposit it in the truck" (Castillo Berthier 1983: 104).

Still today, residential trash is collected by 2,552 trucks on routes that cover the 1,753 neighborhoods in the city. The backs of the trucks are outfitted with plastic bags and metal bins where the workers separate recyclables and organic waste. After the trucks have covered their route, they go to one of the 13 transfer stations across the city, where their load is weighed, checked for proper separation, and then transferred to larger

trailers. From the transfer stations, trash is either diverted to a compost plant, to one of three selection plants for further separation, or directly to a landfill. These selection plants were established in the early 90s to discourage waste picking at landfills.

Across the city, trash is collected every day except Sunday. About 2,000 trucks meander through the streets in the mornings and early afternoons, stopping for a few minutes at a time at designated stopping points every few blocks. Each truck has at least two, and often three or four workers with their own role. Only the truck driver has a contract with the city, so he is the only one who gets paid a salary from the municipality. The other truck workers work as *voluntarios* (volunteers) and only earn money from tips and from the revenue they gain each day by separating the recyclable material from trash that can't be reclaimed, and selling it to a recycling center.

Residents are accustomed to accumulating trash inside their home, carrying it to the truck when they hear the trash bell, and handing it directly to a worker, sometimes along with a small tip. Based on my observations, residents often transport their inorganic trash in small plastic trash receptacles, much like those one might see in home offices or bathrooms. Organic waste is transported in small plastic bags from grocery stores or food markets. Residents who transport trash in plastic receptacles will usually dump the contents directly into the back of the truck without first handing it to a trash worker; this way, they can easily hold on to their receptacle and take it back with them. For organic trash brought in plastic bags, some residents will hand the bag to the trash workers to

handle, or they will toss the whole bag into the organics side of the truck. Because the plastic bag is not compostable, the workers then have an extra step: they reach into the organics bin, open the bag to remove the contents and toss the empty bag into the inorganic section. During my observation, I saw only one resident empty their plastic bag into the organics section and toss the empty bag into the inorganic section.

If residents linger at the truck after handing over their trash, they can see that the workers immediately rip open any bags of inorganic material to sort through them and toss recyclables into large canvas and plastic bags that hang from the back of the truck. If the resident has tossed their material directly into the truck, the workers will rifle through it and remove any material that can be recycled. It's a fast process that looks almost mechanical, and because the workers are directly profiting from the recyclables, they have an incentive to sort as thoroughly as they have time for.

This separation by trash workers functions as Mexico City's residential recycling system. Residents are not typically expected to separate their own recyclable inorganic material, and the roll-out of the proposed residential recycling program that requires residents to separate their plastic, aluminum or paper materials from the rest of their household waste is still five years away.

**Daily Interactions through Trash Collection**

From my observation, residents typically exchange at least a "*Buenos días*" with the collectors, and they often hand them a small tip. Trash trucks generally have a small container tied to the back where workers collect their tips to distribute at the end of the day. A truck will make an extra 100-200 pesos a day from tips ($7-14) that gets distributed evenly among the workers. This is a practice that is discouraged by the Environment Ministry, but the truck drivers say that they need the extra money to use for truck repairs, which they are required to pay for. In addition, the volunteers rely heavily on tips for their income since they do not get a salary from the municipality.

The trucks make stops every two or three blocks on their route, and they stay at each stop for at least five minutes. At certain points they will stay longer, maybe 15 or 20 minutes, because in addition to collecting trash from residents they also receive trash from street sweepers who collect trash in barrels they push on low metal carts. The street sweepers receive tips from residents who hand them their trash, and the street sweepers in turn pay the truck driver a small fee for letting them deposit that trash in their truck. These relationships are firmly established, and a truck crew will expect a particular street sweeper to stop by at a particular stop along the route. At these stops, the truck crew will take time to drink soda and chat with residents.

Although I did not witness many extensive conversations during my observation of two truck routes in Azcapotzalco, I did see many instances of friendliness and genuine connection that make this system of trash collection seem particularly well-suited to support the Environment Ministry's attempts to engage residents in its composting program. On several occasions, residents asked questions about the pick-up schedule or truck stops. One resident expressed concern that his trash, a pile of construction debris, was inappropriately heavy. After a brief exchange with one of the workers, he left the trash in the truck, and a tip in the tip jar.

I also saw interactions between residents, when multiple people arrived at the truck at the same time. They would form a small line or just stand around the truck waiting for their turn to leave their trash, and they would chat briefly with the other people whom they already seemed to know. Perhaps because the majority of the residents leaving trash were women, the brief waiting time seemed to take a surprisingly familiar and friendly tone. At one point, a trash worker jokingly told me to interview a particular resident, an elderly woman, because she talks a lot (Figure #2 and #3).

*Figure #2: Residents leaving their waste at the trash truck*

*Figure #3: Residents leaving their waste at the trash truck*

On the other hand, I also noticed that some workers occasionally seemed upset or impatient with residents for putting their trash in the wrong place. I witnessed a woman gingerly place a cardboard box on top of a bag where workers had been tossing plastic bottles to sell, and a worker immediately knocked the box off with the back of his hand. When they are rushed, some trash workers will roughly grab receptacles out of residents' hands without saying anything.

Because Mexico City has a hybrid worker structure where about half of the trash collectors are formally employed and the other half work without a salary, it is difficult to determine exactly how many trash workers are employed in this system as a whole. Both the salaried and volunteer workers are expected to report for occasional training and meetings, but only the salaried workers receive uniforms and other perks such as occasional bonus payments. Of the 12,740 tons of trash generated every day, it is estimated that about 5,000 tons, or 40% is collected by informal waste pickers or by trash workers before reaching a transfer station (SMA, 2012).

In addition, trash collection and processing is widely acknowledged to be a corrupt industry influenced in large part by *lideres*, leaders of mafia groups that engage in criminal activities. In Berthier's ethnographic investigation of the inner workings of trash collection, he found that a handful of strong leaders liaise directly with city administrators on behalf of the rest of the trash workers (1983). This dynamic persists to some degree today. For example, the environmental education directors from the

Environment Ministry mentioned that some of their data is unreliable because the leaders at selection plants will wet trash to make it heavier so they can get paid more, but they did not go into further detail about how they are able to get away with that dishonesty. Part of the reason could be the connection to organized crime; another reason could be the trash workers' union, which is one of the strongest in the country. The Section 1 of the Sole Union of Workers of the Federal District (SUTGDF Sección 1) has over 18,000 members and carries significant bargaining power. For example, in 2011 it successfully fought for bonus payments for the extra work that the trash collectors do as a result of the implementation of the compost program (SMA, 2012).

The current state of the SWM system in Mexico City presents many challenges for current and future policy and programmatic changes. The municipality's combination of formal and informal workers makes any widespread change difficult to coordinate and to consistently communicate to workers. The vague and overlapping spheres of responsibility of the various offices that deal with SWM further exacerbate this problem. In addition, the sheer visibility of trash separation at collection points reinforces that separation is the duty of workers, not residents. They continue to see that if they do not separate trash themselves, a worker will rapidly do it instead.

All of these challenges directly influence the working conditions of the trash collectors, suggesting that they should central stakeholders of any new SWM program. In the

following chapter, I will provide an overview of the city's compost program and highlight how the trash workers were not formally prioritized in its design yet they have ended up being crucial players in its implementation.

## CHAPTER FOUR: Mexico City's Compost Program: Analysis of Challenges

In April 2003, Mexico City Mayor Andrés Manuel López Obrador and the legislative assembly of Mexico City released an Integrated Solid Waste Law, a 26-page document that outlined the institutional structure of the Integrated SWM system in the municipality, including specific duties and regulatory obligations of each agency involved in SWM (SMA, 2003). This law established the framework for a mandatory composting program to be instituted as a pilot program the following year. This was the city's first Solid Waste Law since the 1960s. The composting program is outlined in the last two of seven chapters in the Law, and Obrador released a separate, more detailed outline of the compost program the following year, called the *Plan de Gestión Integral de Residuos Sólidos* (PGIRS), or the Integrated Solid Waste Management Plan (SMA, 2004).

The 2003 Law and the PGIRS in 2004 highlight the urgency of establishing an integrated approach to SWM in order to effectively reduce the amount of trash that ends up in landfills. Several of the accompanying documents from the same era talk specifically about the city's rapid population growth in the mid- to late-20$^{th}$ century, the steadily increasing per capita trash generation of Mexico City residents, and the dire need for action in the face of the upcoming closure of the city's largest landfill, the Bordo Poniente (SMA, 2011 and 2012, PGIRS 2004). Thanks to these developments in the early 2000s, the Law of 2003 and the subsequent PGIRS have made a significant impact on the solid waste problem. As of 2012, the municipality was collecting 2,214 tons of separated organic waste every day, which represents about 17% of the total trash generated daily.

Because the trash workers separate and sell recyclables before dropping their loads at the transfer stations, the official number from the transfer stations paints a more positive picture: a full 30% of the trash that arrives at transfer stations is diverted to a compost plant, 38% is diverted to a selection plant, and only 32% goes to directly to a landfill. At the 13 transfer stations, the organic waste is compiled and taken to one of six compost plants in the periphery of the city (SMA, 2012).

The composting program still has a long way to go before it can be considered a success. Ten years into the program, only about 50% of the compostable organic waste is being diverted to composting plants (SMA, 2014), and although no official numbers exist to support this, it appears that a significant amount of that diversion is still being completed by the trash workers instead of the residents themselves. Despite the central role that the trash workers have played in implementing the composting program thus far, my review of program documents show that they are largely omitted from official program guidelines, Environment Ministry presentations, and outreach material about the program. They also lack support from the administration that would improve their working conditions and perhaps improve resident participation in the compost program.

**Outreach and Education of Residents**

The entire municipality did not start participating in the program at the same time. A handful of routes in each *delegación* were part of the pilot program that began in April 2004, which impacted about 5-10% of each *delegación's* population, and new routes

were added each year until all 1,753 routes were required to separate out the organic trash by 2011 (PGIRS, 2004). Several neighborhoods in Azcapotzalco participated in the pilot program in 2004.

Each *delegación* managed its own outreach initiatives prior to the roll-out of the program. Under Mexico City's waste management structure, both individual *delegaciones* and the municipality-wide Environment Ministry are responsible for "training," which includes outreach and education programs. The Environment Ministry is charged specifically with programs that train *multiplicadores* (multipliers) i.e. groups of people who have the ability to serve as examples or lead education programs that will influence a larger swath of residents. Examples of multiplier training include the *Escuela Limpia* program at elementary schools and presentations that the Environment Ministry makes at civic organizations and residential complexes. The training that falls under the responsibility of the *delegaciones* is directed at individual residents via house visits and personal interaction. The PGIRS emphasizes the importance of face-to-face interaction as a way to communicate to residents about the program: "It's very important to ensure personal and direct contact with the public, which will happen during the door-to-door outreach of explaining clearly what will happen, resolving any doubts, and taking into account any comments that the public may have" (PGIRS, 2004: 15).

In Azcapotzalco, the outreach process to the general public was conducted over the course of five years, from 2003 to 2008, as routes were added to the program. The

outreach took the form of three house visits conducted by administrators from the *delegación*, as well as a group of student volunteers who were completing mandatory social service hours required of them before graduating from college. About 20 people conducted site visits for the entire *delegación*.

The first visit and second home visits were conducted primarily to inform residents of the upcoming change and to answer any questions. On the third visit, which was conducted shortly before a particular route would actually start separating, each household was given two plastic trash bags intended to help them remember to separate their trash: a grey bag for inorganic material and a green bag for organic material. Each household was only given one of each bag, so this was more of a symbolic gesture to remind households about the upcoming first week of separation, and to help them separate their trash for the first time, rather than serving as a long-term tool.

Initial support for the trash workers consisted of two steps: one municipality-wide training session, and then on-the-truck support by administrators when a route first switched over to separation. The training session focused on demonstrating which kinds of material count as organic. This was also when the workers were shown the fold-out brochures that they would be asked to distribute to residents when they brought their trash to the truck (Figure #2).


*Figure #4: The pamphlet that trash workers were given by the Environment Ministry to hand out during the compost program roll-out*

The on-the-truck support was provided for the first three weeks that a route began requiring separation. A supervisor would ride along the route and explain to residents how and why to separate their trash before bringing it to the truck, and would help the trash workers separate trash that had been given to them mixed together. After those three weeks, the trash workers were considered well trained by the Environment Ministry and the residents well informed of the new rules.

However, because of the lack of coordination between the SMA and individual *delegaciones*, and the poor training and support of trash workers, the separate education and outreach efforts remain confusing and contradictory. For example, the SMA routinely still releases printed outreach campaigns about the composting program at the

same time that *delegaciones* are expected to produce and release their own campaigns. A handful of similar slogans circulate at the same time, painted on trash trucks, on ads at bus stops, and in metro cars. "¡*Vamos a separar, para respirar mejor*!" (We're going to separate, to breathe better!) was a slogan from the Secretaría del Medio Ambiente during the 2011 re-launching of the program, while the slogan on trash trucks in Azcapotzalco was "*Yo Sí Separo*" (I do Separate). Another set of pamphlets on the SMA website has the title "*Solo es Basura si es Revoltura*" (It's Only Trash if it's Mixed) (Figures #5-7).


*Figure #5: One of the initial images for the compost program*


*Figure #6: Example of promotional material for the compost program from the Environment Ministry website*


*Figure #7: The current, municipality-wide slogan for the compost program*

The Education Director from the SMA acknowledged that these competing slogans can be confusing for residents, but she mentioned that it's crucial for each *delegación* to have the power to produce its own marketing material because each *delegación* is handling the program slightly differently.

In addition to the inconsistencies in communication, the actual collection process has also been poorly coordinated and confusing to residents. In the early days of the program, some *delegaciones* split the collection into separate days; Mondays, Wednesdays and Fridays were for inorganic trash, and Tuesdays, Thursdays and Saturdays were for organic trash. This was because none or very few of the trash trucks at the time had two separate compartments for the different types of trash. The trash workers and administrators quickly realized, however, that the separate days were confusing to residents. Residents would complain to trash collectors and administrators, saying that if they missed one day of organic material drop-off, the trash would start to smell and decompose in their home because it would be another two days before they could try to drop if off again.

This was why the administrators in Azcapotzalco decided to have the trash workers collect both kinds of trash every day, even though still very few trucks were outfitted with two compartments. The trash workers were then expected to find a way to adapt their trucks to be able to keep the organic trash separated. Many have adapted by using steel barrels or trunks tucked into an open space on the side of the truck. The inconsistent storage container type, without any official insignia of the *delegación* or municipality, indicate that these adaptations were made by the workers themselves and that they were not provided containers by the municipality (Figures #8 and #9).


*Figure #8: Example of trash trucks that have been informally outfitted with separate compartments for organic trash*


*Figure #9: Example of trash trucks that have been informally outfitted with separate compartments for organic trash*

Today, citywide advertisements for the composting program, on display in metro stations in metro cars, remind residents about the separate collection days. According to the education director of the SMA, the majority of delegations still collect different kinds of trash on separate days, so it still makes sense for the official outreach to be focused on the separate collection days.

**The Challenge of Limited Worker Training**

The PGIRS made clear that training for trash collectors would not be a priority during the rollout of the program. While the guidelines in the PGIRS go into great detail about educational programs in schools and direct outreach to households, they do not mention specific details about how trash collectors will be trained or their potential role in disseminating information. There is also no explicit mention of the direct connection between resident compliance with the program and additional work for the trash collectors.

The lack of attention to worker training may be because the trash collectors themselves are not seen to have a particularly important role to play in supporting outreach efforts about the program. The Education Director from the SMA repeated several times that the focus of their outreach efforts is to residents, not to workers, because residents are the initial creators of trash. Although she did acknowledge that face-to-face interaction is an important element in communicating messages to residents, she did not have much faith

in the workers serving as communicators, or as trash collection points serving as continued points of communication. As she suggested, "[the workers] do explain things to residents, but only when they have an economic stake in whether the residents separate something. If workers can make a lot of money selling PET, they will ask residents to separate PET for them."

Although the PGIRS suggests that individual *delegaciones* should be responsible for training the trash collectors, this did not seem to be the case in Azcapotzalco. The Cleaning Supervisor in Azcapotzalco said that the workers were trained only at a municipality-wide meeting, using material that the SMA provided. The *delegation* did not provide any additional training for its workers. And while the outreach plan outlined in the PGIRS, which Azcapotzalco followed, focused on introducing residents to the program *at* trash trucks and collection points, it relied on student volunteers to communicate the message to residents. The need to coordinate this volunteer labor meant this outreach method could only last a short time: a mere three weeks.

Because of the short period of outreach by volunteers, the PGIRS specifies that the trash collectors should continue to inform the public about the program: "During collection, the cleaning personnel should be instructed to indicate to the public about separation and to report to the *delegación* the areas where separation is not happening adequately so that administrative personnel can visit to reinforce the need for separation" (PGIRS 2004: 56). However, because of the lack of attention to training of trash workers and support for

their role in the continuing community outreach, interviewees suggest that education and outreach remains inadequate, which is one of the main problems holding back the progress of the program. Raul, a truck driver who has worked in Azcapotzalco for 20 years, agreed: "It was a radical change. What happened was – there's been a lack of information. Even today, people still haven't gotten accustomed to separating the trash. So there needs to be more [information] for the program to be accomplished."

Because trash workers are assigned to a particular route that they cover daily, they are intimately familiar with particular neighborhoods and even certain households and they know from personal experience the failures of the outreach and education program. Their added burden to serve as community educators without the support of government places often puts them in difficult situations. Saul, a volunteer who has worked as a collector for five years, talks about how workers try to be tactful with the families who are unwilling to separate: "Yeah, the families that we know more or less, we now have the tact to tell them [to separate]. We might say to each other, 'This family is a little troublesome,' and we'll talk to them a little more gently about it."

As Saul suggests, trash workers have a deep understanding of, and an eagerness to explain, where the trash goes after they leave it at the waste transfer station in Azcapotzalco. One worker, for example, used an empty can of air freshener as a prop while he was explaining to me how the composting facility works. Overall, the workers I spoke with in Azcapotzalco were articulate about the successes, challenges, and

importance of the composting program, although they don't get the chance to show it to administrators.

In fact, one example of the potential role that trash workers could play is provided by the failed Islas program, which illustrates the potential benefits of such interpersonal relationships in environmental education surrounding trash management. Last year, the city installed 128 *Islas de Reciclaje* ("Recycling Islands") in plazas and parks throughout the city. The SMA strategically placed the *Islas* in sites that were functioning as illegal dumpsites, where residents and businesses would leave piles of trash overnight. Each *Isla* had 6 containers for different kinds of waste material and their purpose was to introduce residents to the idea of separating different kinds of trash for recycling.

The SMA quickly realized that residents and businesses had no idea how separate their trash, and the program administrators decided to staff each *Isla* 24 hours a day with a worker who could help residents separate the trash. The workers were trained to separate trash into separate compartments themselves (but were prohibited from receiving tips or keeping any recyclable material to sell), but they were not trained to share that information with residents. The SMA did not want to continue paying to keep each Isla staffed and removed the Islas in early 2014. In this example, if the employed workers had functioned as effective "multipliers" of recycling knowledge, the program might have been able to phase them out after residents became familiar with the separation process themselves, and the program would have been financially sustainable.

**The Challenge of Ongoing Limited Support for Workers**

In addition to the lack of training, the municipality provides little financial and technical support to trash workers, especially given their central role in the composting program. As of 2012, only 305 of the municipality's 2,552 trash trucks had double-compartments for the workers to easily separate organic and inorganic trash. The Environment Ministry's annual inventory from that year indicates that every route in the municipality has separated trash collection, but this data only reflects the fact that all trucks are *required* to separate their loads whether they have a new truck or not. The annual report does not indicate how many routes in each *delegación* are equipped with new trucks, but the Cleaning Supervisor said that other *delegaciones* have "advanced much further" in purchasing new trucks because they have larger budgets.

In Azcapotzalco, only 22 of 80 trucks have a double compartment, though the *delegación* planned to have an entirely new truck fleet by 2010 (Figure #7 and #8). According to the Cleaning Supervisor in Azcapotzalco, the presence of new trucks is the most important motivator for residents to participate in the composting program. "The 22 routes that have new trucks now separate without any problems," she said, and continued:

> The most important [way to improve the program] is to update the truck fleet. The neighborhoods with new trucks with two compartments don't have many problems. The streets are a little cleaner. Otherwise, people start to throw trash in the street, because they don't want to separate. Once

they see that there's a new truck, people feel motivated to separate. I'd say that's the most important: updating the truck fleet.

*Figure #10: An older trash truck with a single compartment*

*Figure #11: A newer truck with two compartments*

Even though the trash workers have not been given updated trucks, much of the burden to comply with the program has fallen on their shoulders. They are punished if their load is not well separated when they deposit it at the transfer station. The quality of each load's separation is determined by workers at the waste transfer stations who help to move each trash truck's load to larger trailers that will make the longer trek to a landfill. If workers at the transfer station determine that a truck's load has a significant amount of organic material still mixed in with the inorganic, they ask the truck workers to go back through and try to separate more out, if possible. The transfer station workers also have the authority to punish the truck workers by suspending them from their duties for three days without pay. For example, the Cleaning Supervisor from Azcapotzalco noted: "Most people learn after that first punishment and we don't have a problem after that."

In 2011, the SMA finally decided that it needed to financially incentivize the collectors in order to increase their participation in the program. Administrators realized that there was a limit to how much responsibility should fall on the shoulders of residents to participate in the program, and that the trash workers themselves would need to step in and separate the trash themselves for the program to be successful. This led to negotiations with the trash workers union for greater worker incentives, as mentioned in the 2012 annual report issued by the Environment Ministry: "[The composting program] had a larger impact after 2011, the year when an accord was established with Section 1 of the Cleaning Union" (SMA, 2012: 24).

According to the Cleaning Supervisor I interviewed, the Public Works agency now gives each paid worker a bonus for the extra work of separating the organic trash. The workers receive this bonus every three months, and it ranges from 1,000 to 1,500 pesos (about $77 to $115 dollars) depending on the amount of organic waste that was separated that quarter, by weight, across the entire municipality. It also varies for workers by their pay level: workers with more seniority and higher pay also get a larger bonus. On the other hand, the volunteers, who comprise at least half and perhaps up to 3/4 of the collection workforce, do not get this bonus.

Trash collection numbers do show that the bonus made a large difference. In 2010, the municipality was collecting 255 tons of organic waste a day, but in 2011 the quantity jumped to 1,656 tons a day and has hovered around there since then (SMA, 2012). However, despite these advances, 10 years after the Solid Waste Law and accompanying composting program were initiated, Mexico City still has a far way to go before it can call its program a success. Although about 40% of the city's waste stream is organic material, only 17% is being diverted to composting facilities – meaning that after ten years, the program is only catching about 50% of what is compostable material. Administrators gave two reasons for the slow progress in the program success: lack of infrastructural support via new trucks, and lack of education and outreach to the general public.

These statements by administrators, as well as the language of the law itself, demonstrate that trash workers are not considered an important element in the implementation of this program. Because administrators underestimate the significant role of trash workers in the composting program, trash workers receive inadequate training and financial and technical support, including inadequate trucks and collection systems. In reality, however, as I have showed in this chapter, they play a central role in the implementation of the composting program, even if they're not sufficiently supported in this role. In the following chapter, I will review the implications of this lack of support and provide recommendations for how the city can leverage the unique role that the workers hold at the intersection of the general public and the program's administrators.

## CHAPTER FIVE: Recommendations and Conclusions

The two main limitations that the trash workers and program administrators identified as hindering resident participation in the composting program are the lack of new trucks and the lack of education and outreach to the general population. Both of these limitations could be alleviated through interventions that are rooted in the experience that the trash workers have had in implementing the program.

While discussing the need for more outreach, the education directors at the SMA talked about the need for more multipliers to help spread environmental awareness. In particular, they consider school children and civic organizations to be the primary multipliers of information about the composting program. Only if I prompted them did they mention that the trash workers themselves in fact serve as multipliers when they remind residents to separate their waste. Instead, administrators repeatedly argued that environmental knowledge needs to be transmitted directly to residents, instead of to the trash workers for them to disseminate to residents.

In addition, while the Cleaning Supervisor in Azcapotzalco was more focused on the need for new trucks, she also did not seem to relate the trash trucks to the workers who would be using them. She instead related her desire for new trucks back to the need for improved outreach about the composting program. When talking about the new trucks, she focused on the fact that they remind residents that the composting program is in

place.

In addition, because program administrators assume that trash workers do not contribute significantly to the spread of knowledge about the composting program, the city's outreach campaign does not take advantage of the multiple points of contact between trash workers and residents along the trash chain. Now that the program has been in place for 10 years with still only about a 50% success rate, it might be appropriate for the SMA to reconsider its engagement techniques and its incorporation of trash workers and trash collection points into the overall program.

Building on this analysis, I offer three recommendations that might spark creative thinking within the SMA or SOS offices about how to leverage the unique position of their trash workers. My recommended interventions will not only better support the important work the trash workers do to implement the composting program, but will simultaneously increase resident participation in the program with the final goal of reducing the burden on the workers to separate the trash themselves.

*1. Improving public perception of workers through training and visual support*

The once-yearly trash worker training programs could be restructured to emphasize communication skills and methods of engagement. Currently, worker training does not seem to be a priority for either the SMA education department or at the *delegación* level; in fact, no one I talked to seemed sure of which agency handles worker training, or what

the training entails. The workers confirmed that their training focuses primarily on the physical nature of their job, yet they had a lot to say about the social nature of their work, as well. Their training should be re-structured to increase worker capacity in both aspects of their work and formalize their informal job of reminding residents to separate.

Ideally, the SMA design team that produces the graphic material for general outreach campaigns should also be tasked with preparing engaging and thoughtful training material for the workers. The material should highlight that their work is multi-faceted and highly valued by residents and the program administrators.

Even gestures such as providing new uniforms for all workers, including the volunteers, could improve the public perception that residents (and program administrators) have of the workers. If funds are lacking for *delegaciones* to buy new trucks, the presence of new uniforms could still signify that the municipality is taking the composting program seriously and investing in the workers who are implementing it. Other options to increase the visibility of the program without buying new trucks include: purchasing brightly colored containers for the workers with single-compartment trucks to separate organics, repainting the older trucks, or piloting a round of marketing material that highlights the role the workers play in implementing the program.

*2. Formalize the on-the-ground insight that the collectors have into trash disposal habits*

Although Berthier hinted at an interesting gendered dimension to trash handling when he specified that mostly women take household trash to the trucks, he did not focus his

investigation on residents as trash generators. No official surveys in Mexico City have been undertaken that focus on trash collection from the resident perspective, and trash collectors could possibly function as distributors of short surveys to collect data for the SMA about disposal habits of residents.

The education director of the SMA mentioned that limited funds prevent them from conducting in-depth market research for or evaluations of their outreach efforts. However, using trash collectors as data collectors could provide deep insight into the perspectives of their target audience; i.e. those residents who handle their household's waste. If it's confirmed, for example, that the vast majority of residents who handle household waste are women, a series of campaigns that are gender-focused could increase a feeling of responsibility for and ownership of the composting program among women.

In addition to providing the SMA with valuable market research, this process could be used to legitimize the on-the-ground experience of workers as they implement the composting program. It could open up avenues for the workers to communicate productively with the composting program administrators and other city officials. The increased communication might then alleviate some of the tension between the cleaners union and the municipality.

*3. Give collectors the authority to fine residents for not complying*

One major issue that the program faces is the lack of responsibility that residents feel for separating their trash, because they face no repercussions if they leave the task of separation to the trash workers. The PGIRS recommended instituting a fine or sanction for people who do not comply with the program, but this policy has not been implemented. The most realistic way to hold residents accountable would be via the trash workers, who are able to see who does and does not separate properly. Requiring the workers to demand payment might create uncomfortable situations for them and for residents, however, in addition to adding more work and responsibility for the workers.

Beyond monetary fines, another option is to take inspiration from a program in Bogotá, Colombia that relied on "social shaming" instead of fines to change citizen behavior. In the 1990s, mayor Antanas Mockus unveiled a plan to creatively reduce minor traffic violations: using volunteer mimes to embarrass drivers at crowded intersections who stop in the middle of crosswalks or drive too quickly in pedestrian-heavy areas. This social shaming dramatically reduced minor traffic violations and has gained international attention (Marsh, 2013).

Using a similar technique, trash workers could have the authority to hand out warning slips for the "problem households" who consistently do not separate their trash. Because it is common for more multiple residents to visit a truck at the same time, the process of handing out a warning slip could be just memorable or embarrassing enough to be

effective without requiring residents to pay a fine. The workers that I observed are engaging and have a sense of humor about their work, and they might enjoy participating in a pilot program to lightly warn residents to separate their trash.

**Caveats and Future Research**

It's important to note that these recommendations are speculative, and that much more research is required before any of them are pursued. Even getting a firm grasp on the program's progress was challenging because the reliability of the municipality's data on waste generation and the program progress is difficult to confirm. The program administrators said that certain numbers pulled from the separation plants are manipulated by the cleaners union, for example. In addition, since approximately 40% of the waste produced in Mexico City is collected and otherwise managed by informal waste pickers, it is difficult to get an overall picture of what kind of trash is being produced, and how much is successfully being diverted from landfills. Except where I noted an inconsistency, I used the SMA's official numbers for this report, but further investigation might reveal other data issues.

In addition, the complex social and political relationships undergirding the trash system make it difficult to understand what kinds of interventions are feasible. The tension between the cleaners' union and program administrators is significant, and I had a difficult time getting either side to talk about the role that the union plays in advocating for its workers. Berthier's 1983 study demonstrates that the municipal trash system is

very political and socially complex, and my short investigation was not able to go beyond a very basic understanding of the players involved.

Due to time limitations, I did not attempt to conduct a true ethnography of the social work of trash collectors as implementers of the composting program, though this would be an interesting topic to pursue. A systematic study of the way the workers interact with residents would better support an argument that they provide an invaluable service beyond physically separating trash and should thus be better supported in their multi-faceted roles.

Ultimately, although Mexico City SWM administrators have designed a composting program and outreach plan that is fairly responsive to the local context, the program seems to have largely ignored the needs of its trash workers, who play a crucial role in implementing the program in the face of low resident participation. If the municipality had worked with the trash workers in the planning phases, the program's budget and design may have looked very different. In a context where the trash workers communicate directly with residents, any added support that makes their job easier might translate into higher resident participation rates in the program. It is in the municipality's best interest to place more stock in the multi-faceted work of its trash workers, and seek ways to meet their needs in reaction to the composting program. This changed relationship between the municipality and its trash workers could result in an improved composting program and increased economic, social equity and environmental benefits

for Mexico City.

**WORKS CITED**


Asamblea Legislativa del Distrito Federal (2006). *Programa Delegacional de Desarollo, 2006-2009: Diagnóstico de Azcapotzalco*. Mexico City.

Bernstein, J. (2004). *Social Assessment and Public Participation in Municipal Solid Waste Management.* (Urban Environment Thematic Group).

Berthier, Hectór Castillo (1983) *La Sociedad de la Basura: Caciquismo en la Ciudad de México.* Mexico City: Universidad Nacional Autónoma de México.

Dirección General de Estadística e Información Ambiental (2005). *Informe de la Situación del Medio Ambiente en México: Compendio de Estadísticas Ambientales.* Mexico City. Available at: http://app1.semarnat.gob.mx/dgeia/informe_04/

Fernández, C. & Martinez, S. (1997) *Reciclaje de Residuos Sólidos Municipales*. Mexico City: Universidad Nacional Autonoma de Mexico.

Gutberlet, J. (2008). *Recovering Resources – Recycling Citizenship: Urban Poverty Reduction in Latin America*. Hampshire, England: Ashgate Publishing.

Hoornweg, D., Thomas, L., & Otten, L. (1999). *Composting and Its Applicability in Developing Countries.* (Urban and Local Government Worksing Paper). Washington, DC: The World Bank. Retrieved July 10, 2014. Available at: http://documents.worldbank.org/curated/en/2000/03/1096683/composting-applicability-developing-countries

Joos, W. et al. (1999). Social Aspects of Public Waste Management in Switzerland. *Waste Management and Research 19(6)*, 417-425. Available at: http://www.sciencedirect.com/science/article/pii/S0963996999000873

Marsh, S. (2013, October 28). Antanas Mockus: Colombians Fear Ridicule more than Being Fined. *The Guardian.* Accessed July 10, 2014. http://www.theguardian.com/public-leaders-network/2013/oct/28/antanas-mockus-bogota-mayor

Medina, M. (2005). Serving the Unserved: Informal Refuse Collection in Mexico. *Waste Management and Research 23,* 390-397.

Morrissey, A.J. & Brown, J. (2003). Waste Management Models and their Application to Sustainable Waste Management. *Waste Management, 24(3),* 297-308. http://www.sciencedirect.com/science/article/pii/S0956053X03001818

Secretaría del Medio Ambiente del Distrito Federal (2012). "Inventorio de Residuos Sólidos del Distrito Federal." Mexico City.

Secretaría del Medio Ambiente del Distrito Federal (2014). "El Manejo Integral de Residuos Sólidos." PowerPoint Presentation. Mexico City.

United Nations Environment Programme. "Regional Overviews and Information Sources: Latin America and the Caribbean." Accssed July 10, 2014. http://www.unep.or.jp/ietc/estdir/pub/msw/ro/Latin_A/Topic_c.asp

United States Agency of International Development (2014). *Solid Waste: Generation, Handling, Treatment, and Disposal.* (GEMS publication No. GS-10F-0105J). Washington, DC. Available at: http://www.usaidgems.org/Documents/SectorGuidelines/SectorEnvironmentalGuidelines_SolidWasteGuidelines_2014.pdf

United States Environmental Protection Agency (2002). "What is Integrated Solid Waste Management?" Available at: http://www.epa.gov/climatechange/wycd/waste/downloads/overview.pdf