



Full length article

Patterns in municipal food scrap programming in mid-sized U.S. cities

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ARTICLE INFO

Keywords:

Municipal solid waste
Food scrap collection
Mid-sized cities
Waste management
Survey data

ABSTRACT

In recent years there has been a modest but noticeable surge of interest from U.S. cities in the diversion of food scraps and other organic wastes from the municipal solid waste stream. Using a unique data set gathered through a survey of mid-sized U.S. cities in 2015, this article examines patterns in food scrap management at the municipal level. Specifically, it studies the extent to which there are shared characteristics among those places most likely to develop municipal capacity for food scrap diversion, and how these patterns can inform policy makers eager to migrate to more sustainable materials management at the local level. We utilize a logistic regression model to test the relationships between two types of food scrap diversion capacities and both socio-economic and municipal waste system characteristics. We find that socio-economic characteristics have limited correlation with the presence of food scrap programming in general in mid-sized cities. Cities with yard waste collection and unit-pricing, on the other hand, are more likely to also have any food scrap diversion programs. We find further that, in mid-sized cities, population density is positively correlated with the curbside collection of food scraps, as is the presence of unit-pricing, while cities that have retained source-separated curbside recycling programs are less likely to have curbside food scrap collection.

1. Introduction

The source separation and recycling of food scraps is a crucial opportunity for municipalities interested in sustainable materials management. It can allow for energy and resource recovery, reduce methane emissions from landfills, and return valuable nutrients to the soil (Platt et al., 2014; U.S. EPA, 2017a). Food scrap recycling also promises a substantial reduction in the nation's disposal burden. The EPA estimates that as of 2014, 14.9% of the entire municipal solid waste (MSW) stream and 21.6% of MSW disposed in landfills and incinerators consisted of food scraps (U.S. EPA, 2016).

Although traditional recycling rates plateaued in the first half of this decade around 34%, food scrap recycling rates nearly doubled over the same period, from 2.7% in 2010 to 5.1% in 2014 (U.S. EPA, 2016). This growth, which corresponds to a full doubling in recovered tonnage, can be attributed to increased media and policy attention to the food waste problem as well as the development of new municipal food scrap composting programs, including a 30,000-person pilot in New York City and smaller programs around the country (ReFED, 2016). A 2014 *Bio-Cycle* survey “identified 198 communities with curbside collection of food scraps, representing 2.74 million households spread out over 19 states” (Yepsen, 2015). The study found dozens more communities with formal drop off programs for residential food scraps, as well as

entrepreneurs across that country that contract directly with households for food scrap collection with no municipal support.

It is widely acknowledged that end-of-pipe management techniques like recycling and composting are less effective than waste prevention (i.e. “reduce” in the 3R waste hierarchy model) in terms of material conservation, greenhouse gas emissions reduction, and fiscal and environmental cost savings (Connett, 2013; MacBride, 2012; U.S. EPA, 2017b). The food system is notoriously wasteful at all levels. As with the recycling of post-consumer paper, glass, plastics, and metals, end-of-pipe food waste composting cannot address the squandering of resources that occurs throughout the industrialized food system, from farm to fork. As estimated by the Natural Resource Defense Council, the American food system wastes as much of 40% of all food between production, distribution, and consumption (Gunders, 2012).

In spite of the acknowledged limitations of municipal composting, post-consumer residential and commercial food scrap diversion is a key area in which municipal policy can serve both to educate consumers and to decrease landfilling. Municipalities, the level of government most often responsible for waste management in the U.S., have only limited influence over material consumption, but their waste management responsibilities offer tools to try to reduce the environmental impacts of consumption and solid waste generation.

While recent studies have documented the growth of food waste

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management capacity nationwide, scholars and practitioners still have little information about the nature of the growth of municipal food scrap programming. Using a unique data set based on a survey of mid-sized U.S. cities in 2015, this article asks whether there are patterns in how food scrap programs (FSPs) are emerging, and how those patterns might inform municipal policy-making for organic waste management. Specifically, it explores the following questions: What types of cities have rolled out FSPs? Are there shared characteristics of the places most likely to develop more aggressive food waste recycling, and if so, what are they? How can these patterns inform policymakers eager to migrate to more sustainable material management at the local level?

2. Literature

Throughout the 1990s, municipal recycling programs proliferated across the United States. Driven by a combination of rising disposal costs, popular demand for more environmentally responsible waste management solutions, and corporate lobbying, municipalities turned to the recycling of a limited set of materials to offset increasing waste disposal rates (Elmore, 2012; Jørgensen, 2013; Lewis, 2004; MacBride, 2012). By the late 1990s, numerous studies had emerged that sought to understand how municipal recycling was spreading, and what techniques and programs were the most effective.

The spread of recycling offers an analogue to current trends in municipal food scrap diversion programs. Today, most U.S. municipalities offer some kind of recycling infrastructure, whether through curbside collection or drop-off facilities. Food scrap recycling, on the other hand, is still in its early days. Here, we use the research on the proliferation of municipal recycling programs in the 1990s to help us develop hypotheses about how and why FSPs are growing the way they are.

The recycling literature has yielded some consensus on key program types that tend to result in the most effective recycling rates. System costs—passed on to consumers through unit pricing or pay-as-you-throw (PAYT) schemes—consistently registers as an effective means to improve both resident participation in recycling programs and actual diversion rates in the United States and across many other national contexts (Folz and Giles, 2002; Ferrara and Missios, 2005; Kipperberg, 2007; Yang and Innes, 2007; Starr and Nicolson, 2015; Gellynck et al. 2011; Dahlén et al., 2007). Convenience, characterized by curbside collection rather than drop-off programs, also improves recycling program effectiveness, as does access to the same or greater frequency of recycling collection compared with garbage collection (Abbott et al. 2011; Cole et al., 2014; Dahlén et al., 2007; Kipperberg, 2007; Miafodzyeva and Brandt, 2013; Mueller, 2013).

Scholars have also examined how demographic and municipal characteristics affect system performance. Starr and Nicolson (2015) find that higher levels of educational attainment are associated with higher levels of recycling, supporting earlier findings by other researchers (Callan and Thomas, 1997; Lakhani, 2014; Siddique et al., 2010). Income has also been studied as it relates to both waste generation rates and recycling rates; in general higher incomes tend to be associated with higher rates of waste generation, and with higher rates of recycling (Gellynck et al., 2011), although this is not always the case (Parfitt and Robb, 2009).

During the early 1990s, Feiock and West (1993) studied the diffusion of recycling programs using a variety of policy diffusion models drawn from the political science literature, including need/responsiveness, diffusion of innovation, political institutions, federalism, economics, interest group influence, and administrative capacity. They find that cities with less available disposal capacity are more likely to adopt curbside recycling and that strong state directives that mandate or encourage waste reduction and recycling are significant. Finally, higher per capita incomes are strongly correlated with higher probabilities of having a curbside recycling program.

In a similar investigation of the adoption of unit-pricing systems in

Massachusetts, Callan and Thomas (1999) find that education, age, income, and rural classification all have significant effects on the likelihood that a municipality will adopt PAYT. For education, they find that increasing educational attainment increases the likelihood of adoption. They find that as income increases, communities are less likely to adopt PAYT. In terms of age, they identify a quadratic relationship signifying that adoption of PAYT is least likely for communities whose residents are either relatively young or relatively old, and more likely for communities whose residents are middle-aged.

Though not precisely analogous to the adoption of municipal FSPs, the adoption of recycling and unit pricing provides a set of hypotheses for how we might expect food scrap composting to be adopted. Drawing on these previous empirical findings, statistics on age, income, population density, housing, educational attainment, and the presence of other types of municipal waste management programming are all tested here as potentially associated with the adoption of FSPs.¹

3. Data & methods

This research relies on a unique data set collected through a survey of mid-sized U.S. cities in the fall of 2015. The survey, conducted by the research team, targeted public-sector waste and sustainability managers in U.S. cities with populations over 100,000. We decided to focus initially on mid-sized and large cities in order to capture a variety of urban settings, while excluding smaller urban areas. In the U.S., small cities and large towns often rely on drop-off programs or on individual hauling contracts for waste and recycling services. Also, in small cities, towns, and unincorporated areas, county government sometimes provide core municipal services such as waste management. County-provided services, individual contracting, and drop-off systems differ substantially in terms of policy, infrastructure, and planning, from larger municipalities that publicly manage the collection of at least the residential portion of the waste stream. By using the 100,000-person cut-off, the sample includes only cities generally large enough to provide public oversight over municipal waste management. This cut-off also ensures that the sample includes only urban areas with a diversity of land uses and relatively dense settlements. Therefore, by focusing on cities with populations of 100,000 and greater we ensure a reasonable degree of comparability among system types. In addition, the cities in this size stratum are home to more than 89 million people, 28% of the total U.S. population, meaning that trends in cities of this scale are consequential (U.S. Census Bureau, 2015, Table B01003).

The survey was an online instrument, distributed to respondents by email after contact was established by email or phone. It included 52 questions of varying structure about waste system characteristics, infrastructure, degree of private sector involvement, collection techniques, financing, programmatic operations, and system goals and plans.

To recruit survey participants, researchers conducted telephone and email outreach using contact information listed on city websites. Surveys were sent to the 220 cities for which contacts were successfully established. Of these, 116 complete responses were received from cities, representing a response rate of 53%. Only one response came from a city with a population over one million; this response was removed because it represented an outlier in terms of population size, and would not have allowed us to effectively evaluate cities at that scale. Therefore, the data set analyzed here represents only mid-sized U.S. cities with populations between 100,000 and one million.

¹ One variable related to waste system performance that has been well studied—the degree of public and private sector participation in waste management—is not included in this study. Research has shown that private sector interests can drive waste management outcomes (Howell, 2015). In the U.S. context, however, waste management has always functioned as a public-private hybrid (Melosi, 2005), and nearly all systems in our sample have some degree of private sector participation. It is therefore not likely to have a significant bearing on the adoption of new program types in this context.

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