Increasing Public Participation in Municipal Solid Waste Reduction

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ABSTRACT

Municipal solid waste (MSW) presents environmental, social, and economic problems. Enlisting the public in reducing MSW has proven to be difficult in a variety of cultures and economies. Although the waste diversion practice of recycling is well-known, other waste minimization behaviors remain unknown and unpracticed by the majority of the population. There is room for improvement in waste minimization and waste diversion participation. This paper examines research into what motivates and what hinders participation in waste diversion and minimization practices by drawing out the common factors found in a wide spectrum of studies. Fear of the actual and perceived dangers of waste, combined with social norms and stigmas attached to waste, have precluded most societies from making more radical changes in their waste systems. Recommendations for increasing participation in both the industrialized and developing nations reflect the findings of research into what has been successful and what needs to be overcome. Waste and consumption practices are multi-dimensional and the methods for engaging the public in reducing MSW must incorporate feelings, practical considerations, and education.

Key Words: waste reduction, recycling, sustainability, waste management

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INTRODUCTION

What a person decides to purchase, finds appropriate to wear, deems safe to eat, and discards into the trash is largely determined by culture (Gregson and Crang 2010). Individuals and societies have demonstrated wide differences in these choices throughout time, but share the tendency to ignore materials and place them out of sight once they are considered waste (Douglas 1966; Lynch 1990). As income levels rise across the globe, consumption levels are escalating in most
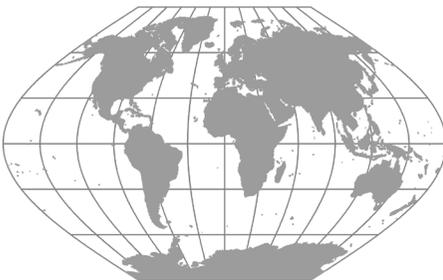
countries. This is leading to a proliferation of waste disposed of in landfills, incinerators, and open dumps (Uiterkamp et al. 2010). Waste diversion through recycling and composting is part of the solution to the problems created by waste in modern consumer-driven societies, but waste minimization is also vital piece of the sustainability puzzle. This paper explores the commonalities found in studies of household solid waste minimization and diversion behaviors in differing cultures and economies. Drawing upon these common themes, I will then suggest ways that these strategies could be used by government agencies and other organizations seeking to increase the diversion of waste from disposal and reduce the amount of material considered waste.

THE UNSUSTAINABLE NATURE OF MUNICIPAL SOLID WASTE

"Waste is what is worthless or unused for human purpose…It is the spent and valueless material left after some act of production or consumption, but can also refer to any used thing: garbage, trash, litter, junk, impurity, and dirt" (Lynch 1990, 146). Tammemagi defines municipal solid waste (MSW) as those waste streams emanating from residents, institutions, municipal services, and small businesses (1999). Data from 2008 indicates that 4.62 pounds of MSW is generated per person in the U.S. every day, up from 2.68 pounds per person per day in 1960 (US EPA 2008). European countries also produce significantly more MSW per capita on average than developing countries. The Department for Environment, Food, and Rural Affairs (DEFRA) in the U.K. estimated MSW generation at 1.78 pounds of MSW per person per day in 2008 (DEFRA 2009). Although this represents a decline from 2007, only 36% of the MSW in the UK is being recycled (DEFRA 2009, 2), so there is still a significant amount of recoverable material being incinerated or buried.

The system of burying and burning waste is unsustainable due to the environmental,

social, and economic costs involved. Sustainability is used to describe processes that support and protect the environment, contribute to a steady economy, and perpetuate an equitable social system in a manner that maintains the integrity of these interrelated systems for future generations (Edwards 2005; Wheeler & Bijur 2000).

Current methods of waste disposal create environmental problems by releasing harmful substances into the soil, water, and air (Hutchinson 2008). As Platt and Lombardi illustrated in their study, landfills are a major anthropogenic source of methane (2008). Themelis and Ulloa estimated the global landfill emissions of methane on the order of 45 million tons (2007). Since methane has 20-23 times the atmospheric warming potential of carbon dioxide (Akunna et al. 2009), the amount of methane released into the atmosphere by landfills across the globe is equivalent to one billion tons of carbon dioxide (Themelis and Ulloa 2007). Waste also has a social cost. The current system of waste disposal creates the environmental injustice of waste facilities being located near the poorest members of society (Porter 2002; Watson and Bulkeley 2005), and an increased physical risk borne by those who work with waste (Gutberlet 2008; van Beukering 2001). A review of several studies of US waste-to-energy facilities by Carr found that choices of where to site facilities were not made to intentionally put disadvantaged populations closest to waste treatment. Rather, it is the lower cost of purchasing land that drives the placement decision. The study confirmed that areas near waste facilities do tend to be areas of low income, but the racial and ethnic make-up of these areas varies (1996). The unsustainable nature of the current system is also reflected in the economic costs of removing resources by burying or burning. Kinnaman (2009) points out that as landfills and incinerators decline in number and increase in capacity, municipalities are incurring an expansion of costs associated with transporting and dumping waste to the larger facilities located further away from popula-

tion centers. Ironically, part of the reason for the increased distance can be attributed to the resistance citizens mount against the construction of these facilities (Rootes and Leonard 2009). Employing the knowledge gained over the last two centuries to move away from this unsustainable waste system entails changes in individual consumer habits and attitudes (Bulkeley and Gregson 2009, Gregson and Crang 2010), as well as changes in the production and disposal of goods (Mc-Donough & Braungart 2002).

THE IMPORTANCE OF REDUCING MSW

Nations, municipalities, and communities seek to reduce their dependence on landfills and incinerators by increasing recycling, composting, and at-source reduction (Corral-Verdugo 2003; Kipperberg 2007; Linde and Carlsson-Kanyama 2003; Matete and Trois 2008; Read et al. 2008). There has been an emphasis by governmental agencies on waste diversion through recycling and composting, without the same emphasis on waste minimization (Bulkeley and Gregson 2009). Clearly, with the most waste per capita being generated by the industrialized nations, the largest potential for waste diversion and minimization is found in changing the practices of those consumerist societies. The task of reducing the amount of MSW going to disposal facilities has been largely based on legislative approaches with mandatory recycling programs and pay-as-you-throw fee schemes (Kipperberg 2007, Linde and Carlsson-Kanyama 2003; Read et al. 2008). These schemes place the burden of waste diversion onto the consumer by creating incentives for, or by requiring, behavior changes (Bulkeley and Gregson 2009). Increasingly, proponents of waste reduction have been looking beyond compliance with regulations into research about how individual attitudes and social norms influence waste minimization behaviors (Babcock 2009; Barr 2003; Shaw 2008). Recycling has become an established norm for many communities (Barr and Gilg

2005), but it is far from a universal practice (Shaw 2008).

MORE WASTE DIVERSION AND REDUCTION IS NEEDED

Nixon and Saphores indicate that although the overall recycling rate of MSW for the U.S. reached 32% in 2006, this figure varies drastically from state to state (2009, 258). DEFRA reported that the U.K. achieved a 36% rate of recycling MSW in 2008 (2009, 5), which is still short of its goal of achieving 75% diversion of household waste by 2019 (Phillips et al. 2010). Simply setting goals for waste diversion and tasking local municipalities with reaching those goals fails to acknowledge the limited power of the municipality to determine how much waste is generated by producers and consumers (Watson and Bulkeley 2005). It also imposes time, space, and labor demands on households with little regard for the rhythms and practices of waste generation already in place (Bulkeley and Gregson 2009). These waste diversion targets have increased practices such as donation of material goods, composting, and recycling, but there has been a lack of effort in government policies to address reducing waste through practices such as reduced consumption and changes in manufacturing (Bulkeley and Askins 2009).

Increased consumption has resulted from populations in developing countries experiencing increases in disposable income, with the result that more MSW is generated (Troschinetz and Milhelcic 2009). Mimicking the consumer practices of the industrialized nations has led to the similar custom of thoughtless disposal of goods. Matete and Trois cite the "poor environmental and waste awareness of the general public" as one of the most important obstacles to effective management of MSW (2008, 1480). Therefore, research into how to engage households in waste diversion and minimization practices has been conducted in Brazil (Gutberlet 2008), Mexico (Corral-Verdugo 2003), and South Africa (Matete and Trois 2008).

Despite the drastic differences in infrastructure and economic levels, studies into household waste behaviors and attitudes indicate similarities in what discourages and what encourages participation in sustainable MSW management between industrialized and developing nations. Though what is considered waste varies with culture and socio-economic status (Bulkeley and Gregson 2009), the emotional response to what is considered waste is similar across cultures and social classes. "Waste frightens us" (Lynch 1990, 164). Expressed directly or indirectly, waste triggers fear (Douglas 1966), shame (Gutberlet and Jayme 2010), and denial (Rathje and Murphy 1992).

BARRIERS AND MOTIVATORS TO PUBLIC PARTICIPATION IN MSW DIVERSION

When people understand the connection between their behaviors and environmental harm, they are more likely to engage in pro-environmental behaviors (Babcock 2009). To facilitate this understanding, government attempts to elicit greater waste awareness have been primarily based on disseminating information to the public (Fahy and Davies 2007). Mandating recycling participation can also result in higher participation rates (Kipperberg 2007). However, waste minimization behaviors are multi-dimensional (Barr 2003). There is a spectrum of reasons individuals choose to engage in waste reduction through recycling, composting, donations, reuse, and responsible consumption (Kennedy et al. 2009). A number of trends have emerged in the research that indicate there are shared characteristics to be found across individuals of differing education, income, and age levels that help to explain what prevents and what promotes waste minimization and diversion behaviors (De Feo and De Gisi 2010). The bulk of the research into waste behaviors has concentrated on recycling, since the bulk of government policies have focused on recycling programs. Waste minimization strategies such as re-use, reduced consump-

tion, and manufacturers' take-back programs currently have far less environmental impact than recycling and should receive more attention from those people and agencies seeking to improve the waste management system (Bulkeley and Gregson 2009). What follows is not intended to be a comprehensive list, but presents theoretical concerns to serve as a point of entry for understanding how best to promote further waste diversion and minimization behaviors across many different cultures, countries, and economic levels.

BARRIERS TO PARTICIPATION

Lack of access to or inadequate facilities

Derksen and Gartrell determined in their survey of Alberta, Canada residents that although there was a positive correlation between wanting to protect the environment and desiring to participate in recycling, that concern could "not overcome the barriers presented by lack of access" to recycling centers (1993, 434). Informal recycling systems prevail in the developing countries, due to the lack of recycling collection infrastructure provided by the government or private companies (Gutberlet 2008; Matete and Trois 2008). Lack of access to recycling facilities is represented as a major reason for households in developing countries not to participate in recycling (Corral-Verdugo 2003; Troschinetz and Mihlecic 2009).

Inconvenience and lack of knowledge

The majority of Galway, Ireland residents listed the inconvenience of sorting the recyclables into multiple bins against the convenience of putting all the waste into one bin as the main reason for not recycling (Fahy 2005, 561). In response to a survey of U.S. households, Nixon and Saphores determined that inconvenience is a significant barrier to recycling participation (2009). Not enough space to store recyclables or items for reuse was noted as a major inhibitor of recycling and

reuse in both Mexico (Corral-Verdugo 2003) and the U.K. (Barr 2003). Lack of knowledge about what and how to recycle emerged as a dominant factor in the decision to recycle in a survey of Alberta, Canada residents (Kennedy et al. 2009). Babcock (2009) and Fahy (2005) each refer to the difficulty in knowing 'the right thing to do' as barriers to engaging in responsible environmental behaviors.

Government policies and public mistrust of authority

Troschinetz and Mihelcic describe the lack of governmental policies, incentives, and enforcement as a barrier to waste diversion in 63% of the 23 cases studied (2009). Furthermore, Fahy identified a lack of trust between the public and authorities as a reason many residents of Ireland refused to participate in government-led waste management programs (2005). A perception on the part of some UK residents that recycling is something done only to benefit the government was described in a study by Bulkeley and Gregson (2009).

Expense of waste minimization and diversion

Kinnaman has pointed out that municipalities are subsidizing MSW recycling programs in the U.S., Japan, and some European countries in order to avoid the social cost of disposing of it (2009). New York City found their recycling program to require more in labor and transportation costs than the income received through the sale of the recyclable material and reduced the materials collected and the frequency of collection in 2002 (Clarke and Maantay 2006, 130). The expense of collecting recyclable materials has been listed as one reason municipalities may resist developing a curbside recycling program (Peretz et al. 2003). Mexican households interviewed by Corral-Verdugo indicated they could not afford to spend the time required to collect, sort, and return recyclables as one of the reasons they did not recycle more items (2003).

Value-action gap

The discrepancy between people's concern over the environmental harm posed by household waste and the limited action by those same people to reduce their waste or engage in other pro-environmental behaviors is referred to as the value-action gap (Fahy and Davies 2007). About 72% of the respondents in a survey of Alberta, Canada residents reported there was a gap between their intentions and their actions in regard to environmental protection (Kennedy et al. 2009, 151). Although surveys have indicated a strong social norm supporting protection of the environment, there is also a tendency to disbelieve that the cumulative effect of individual actions are as harmful as industrial sources (Vandenbergh 2005).

Emotional response to waste

Humans are naturally averse to anything that threatens their survival or health and the treatment and disposal of modern waste often contains chemicals, gases, and liquids that pose a health hazard (Gutberlet 2008; Williams 2005). Not only are there actual dangers associated with waste, but waste is symbolic of the end of utility or "life" of an object and that association can generate fear (Lynch 1990). Waste is buried or burned, just as human corpses are buried or burned (Douglas 1966). Compounding the fear generated by the symbolic and practical risks posed by waste are the racial and class prejudices connected to waste and those who work in MSW disposal (Ackerman 1997; Gutberlet and Jayme 2010).

MOTIVATORS FOR PARTICIPATION

Social norms

People are more likely to recycle when they observe others in their vicinity recycling (Shaw 2008). Barr noted the public nature of curbside placement of recycling elicits greater participation through the establishment of recycling as a norm for that area

(2003). Hage et al. determined in a survey of Swedish households that "the self-image of being a norm-compliant person represents the major driving force behind households' recycling efforts" (2009, 157). Municipal recycling programs are rare in the developing world. The affluent members of those societies have established reliance on informal recyclers to sort through their household waste as the norm for recycling behavior (Gutberlet 2008).

Concern for the environment

In a survey of U.S. households, it was found "that people who believe recycling substantially reduces the use of landfills and conserves natural resources are more likely to recycle" (Nixon and Saphores 2009, 272). Tudor et al. demonstrated a correlation between recycling behaviors and pro-environmental attitudes in their survey of health service employees in Cornwall, England, (2007). Analysis of the interview responses by northern Mexico residents demonstrated that adequate facilities and economic status dominated recycling and reuse practices, but environmental preservation was also listed "as an important reason for reuse and recycling" (Corral-Verdugo 2003, 279).

Personal and community benefits

Lauf discovered in her analysis of three recycling programs in Illinois that the lower the cost to the individual household to recycle, the more likely that household would participate in a recycling program (2008). In his analysis of previous research and the survey results of households in Exeter, U.K., Barr determined that people who saw waste as an immediate threat to them were likely to engage in waste minimization behaviors (2003). Providing construction employees in Hong Kong with personal financial rewards for waste reduction resulted in a 25% reduction in construction waste over a three month period (Tam and Tam 2008, 43). The sense of community felt in the U.K. during World War II not only contributed to the

widespread participation in the recovery of salvageable materials, but it also influenced the population to be conservative in their use of resources in order to provide for the needs of the larger community (Riley 2008).

Knowledge of procedures and practices to reduce waste

Barr et al. indicated that recycling behavior is strongly influenced by the knowledge of where, when, and how to recycle (2001). A positive correlation between knowledge about what constitutes an environmentally responsible behavior and engaging in that behavior was made by Kennedy et al. (2009). However, McKenzie-Mohr and Smith emphasize the need for information about environmentally responsible behaviors, such as recycling and waste minimization, to be presented in a culturally and emotionally appropriate context (1999). Flyers distributed to residents of Victoria, British Columbia by the municipality reinforced negative stereotypes of informal recyclers, rather than emphasizing the environmental benefits of their work (Gutberlet and Jayme 2010).

Convenient access to facilities and adequate programs

Recycling programs in the U.S. have the highest participation rates for cities of comparable size when they provide convenient recycling programs (Peretz et al. 2005). Residents of Galway, Ireland cited the ease of access to facilities as a major reason to participate in waste management programs, second only to concern for the environment (Fahy 2005, 561). Troschinetz and Mihelcic identified lack of facilities as a barrier to recycling in developing countries in 79% of the 23 case studies they analyzed (2009, 920).

Methods to increase participation in MSW minimization and diversion

Similarities become apparent after reviewing the literature on what encourages or

discourages people from engaging in waste minimization and diversion behaviors. It is also evident that the majority of research has concentrated on recycling behaviors, and there is less research on waste minimization behaviors (Tucker and Speirs 2003). The recovery of materials from MSW remains below 50% in most industrialized countries (De Feo and De Gisi 2010; Nixon and Saphores 2009). It is less than 10% in the developing nations (Matete and Trois 2008; Troschinetz and Mihelcic 2009). Consequently, understanding how to increase participation in recycling is an important part of moving to a more sustainable waste management system. Nevertheless, reducing waste is more than recycling and composting. There is a need to convince individuals to expand their waste behaviors to include reuse and reduced consumption (Barr and Gilg 2005; DeGraaf et al. 2001). In addition, government policies should be created to provide incentives for manufacturers to reduce waste and produce products that are designed to be reused and recycled (McDonough and Braungart 2002; Nixon and Saphores 2009). Expanding on what has already been discussed, I will now suggest some strategies for overcoming the barriers and building on motivators to increase public participation in reducing MSW.

Use the power of social norms

McKenzie-Mohr and Smith emphasized the need for people to follow an example in order to adopt new behaviors (1999). Individuals can influence their own communities by following the suggestion by Shaw of using transparent bags for recycling to make the recycling efforts visible to the neighbors (2008). Cotterill et al. found that collective action established recycling as a norm when people observed others on their street engaged in recycling (2009). A municipality could provide "We Compost" stickers for the residents engaged in composting for the curbside trash cans and begin to establish composting as a norm in that community (McKenzie-Mohr and Smith 1999). If gov-

ernments or non-governmental organizations (NGOs) were to publicize comparisons of the waste minimization efforts between comparable communities, they could not only provide an opportunity to learn from one another, but would also reinforce the idea that waste minimization is a social expectation beyond any one community (Folz 1999). Gutberlet and Jayme note that recognizing MSW minimization and diversion efforts as part of improving the community's health could reduce the stigma attached to those who handle MSW and place value on the service they provide to the community (2010).

Emphasize the environmental benefits

Fahy and Davies found "behavior driven by environmental citizenship is more likely to continue in comparison to behavior driven by financial incentives" (2007, 21). In an effort to capitalize on this connection between environmental concern and waste management, campaigns by government agencies and NGOs have focused on the environmental harm unmanaged waste inflicts upon the environment (Rogers 2005). Yet, other research shows that when people are overwhelmed by negative environmental messages, they can respond with feelings of helplessness and take no action (Winter and Koger 2004). Messages to encourage waste minimization behaviors need to focus on the positive environmental gains, as has been done in the "Waste Wise" compost promotion in Calgary, Canada (Einseidel and Morrison 2008). Acknowledging recyclers as environmental operators has been done by the local municipalities in Diadema, Brazil and Cairo, Egypt, further emphasizing the environmental benefits of waste diversion (Gutberlet 2010). Similarly, when governments, municipalities, or NGOs publicize the amount of waste reduced or diverted by a region (Read et al. 2008) that information can help link participants' individual behavior to the overall benefits from waste minimization programs (Riley 2008).

Demonstrate personal and community benefits

In their survey of Cornwall health workers, Tudor et al. noted a positive correlation between perceived benefits to themselves and recycling, (2007). Corral-Verdugo found in his interviews with northern Mexico residents that the main motivations for recycling and reuse were related to personal benefits and economic savings rather than environmental concern (2003). Home composting participants in England cited the benefits to the soil in their personal gardens as a major reason for home composting (Tucker et al. 2003). Reducing the amount of litter on the streets through recycling programs is seen as a community benefit both in the developing world (Gutberlet 2008; Troschinetz and Mihelcic 2009) and the industrialized nations (Fahy 2005; Kennedy et al. 2009). Individuals and organizations should emphasize these benefits when promoting waste behavior changes.

Provide convenient access to facilities and adequate information

According to Derksen and Gartrell, "the most important determinant of recycling behavior is access to a structured, institutionalized program that makes recycling easy and convenient" (1993, 439). Governments and municipalities can increase participation by improving access to waste diversion facilities. Landlords can also improve participation by improving access within multi-dwelling complexes. The convenience of reducing the distance apartment dwellers had to travel to deposit their single-stream recyclables was found by Ando and Gosselin to improve household participation by as much as 66 % (2005, 436). Residents of Alberta, Canada have access to facilities, but report that they do not feel well-informed by the government about waste minimization practices (Kennedy et al. 2009). Advocates for increasing recycling and waste minimization behaviors in developing nations call for governments and municipalities to improve access to fa-

cilities and increase educational programs as methods to improve waste management (Gutberlet 2008; Matete and Trois 2008; Troschinetz and Mihelcic 2009).

Appeal to positive emotions surrounding waste minimization

Transforming people's relationship to waste by emphasizing the environmental, economic, personal, and community advantages to the reduction of MSW could be more effective than simply providing information (Kennedy et al. 2009; Rathje and Murphy 1992) or assigning blame and eliciting guilt (Kanner and Gomes 1995). The unconscious fear elicited when people are confronted with waste and its symbolic reflection of death (Douglas 1966) is reinforced by campaigns emphasizing the hazards of waste disposal (Hawkins 2006). Education by governments or NGOs directed at the public need to recognize the fear associated with waste and search for non-threatening methods for overcoming these negative feelings. For example, Mierle Laderman Ukeles, the artist-in-residence at the New York City Sanitation Department, created a piece, "The Social Mirror" (1983) which involved covering the sides of a waste collection vehicle with mirrors to allow people to see themselves in the waste disposal process (Brooklyn Museum 2010). Musical art is created by PickleHerring Theatre, a NGO group from the UK, as they make instruments from waste materials in their workshops on community development and environmental education (Smith 2008). Another method for transforming the social norms surrounding waste would be to utilize the human affinity for ritual (Lynch 1990). Ecopsychologist Phyllis Windle notes people have long used ritual to cope with death and loss, and ecologists could benefit by incorporating rituals into affirming the replenishing cycle of reuse (1995). It has been shown that recycling has imparted a sense of ritual purification to household chores (Hawkins 2006). This same affinity for ritual could be promoted by retailers who reward consum-

ers for returning containers and used goods to the store when purchasing more items. Municipalities could build on the recycling ritual by launching community composting programs that replicate practices already established for recycling.

Waste minimization through responsible consumption

The current state of production exploits primarily non-renewable and non-recyclable materials (McDonough and Braungart 2002) and creates unusable waste products when the items reach the end of their utility (McDonough & Braungart 2002; Rathje and Murphy 2001). Although industry is responsible for the majority of waste generated during production (Williams 2005), individuals are still responsible for a great deal of environmental harm caused by the cumulative effect of unsustainable waste disposal practices (Vandenbergh 2005). Fahy indicated in her study of Irish households that respondents were reluctant to take responsibility for waste management problems and were unaware of what they could do to alleviate those problems (2005). This response was echoed in the De Feo and De Gisi survey of southern Italian residents when respondents named consumerism as the main reason for waste, but put the responsibility for managing it on the municipality (2010). Educating the public about the need to make consumption decisions with the disposal of consumer goods in mind is a need not yet fulfilled (Davoudi 2009). McDonough and Braungart advocated labeling products with clearly identifiable disposal, reuse, and recycling options in the same way nutrition information is supplied on food labels as one method to increase consumer awareness (2002). By connecting the self-image most people have of themselves as being environmentally conscious (Barr and Gilg 2005; Kennedy et al. 2009) to their identity as consumers, some companies have begun to market their products as beneficial to the environment (Pickett-Baker and Ozaki 2008).

The success of this marketing approach by producers could be applied by NGOs to the notion that consuming less stuff is in keeping with a compassionate and environmentally aware identity (Muldoon 2006; Sparks and Sheperd 1992). Eventually, as consumers become more educated about the benefits of and need to reduce and eliminate MSW, they will begin to demand more products made from materials that can easily be returned to manufacturers and not require disposal.

Marketing and labeling by the producers are not the only methods for using consumption as a tool for MSW minimization. Policies by governments and municipalities can also aid in shifting production away from disposability and towards designing for recycling in the production process (Babcock 2009). As municipalities come to view solid waste management as an unfunded mandate placed upon them by manufacturers of unrecyclable products and packaging, and refuse to allow the sale of these items in their community, municipalities will play a larger role in pressing manufacturers to take responsibility for the recovery and recycling of their products (Leroux 2001). Providing incentives to manufacturers by increasing the costs of extracting virgin materials and involving them in the expense of disposing of their products are other ways governments can make producers more accountable for disposal and reduce waste (Nixon and Saphores 2009). Municipalities can support extended producer responsibility (EPR) programs by banning the disposal or incineration of recyclable goods and products that are covered by government EPR programs (Gaudart 2006). Mandatory recycling programs have been proven to increase the recovery of materials from MSW (Folz 1999; Kipperberg 2007). However, waste minimization programs that focus on the 'bottom-up' approach to waste reduction have also been proven to be effective. New York City's citizens advocating for Zero Waste have succeeded in creating more recycling options (Clarke 2009). The Zero Waste Places pilot programs in England succeeded and, in some cases, surpassed their goals (Phillips et al. 2010).

CONCLUSION

The current rate of waste production and methods for waste disposal are unsustainable due to environmental, social, and economic costs. Changing this system requires changing the waste practices and attitudes of individual consumers, government agencies, and manufacturers of consumer goods. Citizens in both industrialized and developing countries must learn to view materials as not simply a nuisance to be rid of, but more as a resource to be valued and conserved. Despite the radical differences in culture and economy between nations, research into this issue has revealed there are common themes in what prevents and what promotes waste diversion and waste minimization behaviors.

Common barriers include a lack of access to or inadequate facilities; mistrust of government; the expense of waste diversion programs; the value-action gap; and the negative emotional response to waste. Commonalities among the motivators for participation in waste diversion and waste minimization include social norms for engaging in a specific activity; concern for the environment; personal and community benefits; knowledge about waste diversion and minimization practices; and access to facilities. In presenting these themes, this paper has sought to make use of the information gleaned through research to recommend approaches and techniques that can be applied by individuals, municipalities, governments, and non-governmental organizations to increase public support and participation in waste diversion and minimization.

Social norms can be activated by individuals and communities in publicly demonstrating their commitment to sustainable waste practices. In educating the public about the importance of reducing and diverting waste, municipalities and NGOs should emphasize the environmental benefits, rather than the environmental harm, to associate waste practices with positive emotions. Emphasis on the benefits to individuals and communities by participating citizens, municipalities, and

government agencies is another method for enlisting greater public support and participation. Both building owners and local governments should be sure the access and convenience of their recycling and composting programs are meeting the needs of the residents to ensure maximum participation. The combination of these practical techniques with incorporating art, music, and ritual into the waste practices of individuals and communities can contribute to the transformation of attitudes and waste practices from something to be avoided and left to others into something that generates pride and personal responsibility.

A transformation of consumer practices is also an essential piece of the sustainable waste solution. Simply diverting waste is not sufficient to address the problems associated with modern waste management. Responsible and reduced consumption is also critical to reduce the quantity of materials requiring disposal. If governments and municipalities incentivize re-use and recycling for the producers of consumer goods, they will also be reducing the burden of waste disposal. The problems presented by MSW are too large to be confined to the responsibility of only consumers or government or manufacturers; they require the active participation of all.

The technology exists to lessen the damage created by massive disposal of resources, but it will only be employed when society acknowledges the need for new attitudes and practices. By finding innovative ways to educate people, attending to the emotional reluctance to deal with waste, and reducing the social stigma of working with waste, agencies seeking to improve waste minimization behaviors can garner greater public support. There is no simple solution to the problems created by MSW. As methods proven to increase participation in waste diversion are applied to include waste minimization behaviors, more research needs to be done to understand how to encourage environmentally responsible waste management practices in different contexts throughout the variety of cultures in the world. There has been improvement

in participation and awareness of the need to divert waste, but this improvement needs to continue in order to reduce the damages caused by unsustainable waste management. Industrialized nations have greater resources to devote to researching the issue. Just as richer nations have served as models of consumerism for developing nation they can also serve as models for reducing municipal solid waste.

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