FACTORS INFLUENCING THE IMPLEMENTATION OF

COMMUNITY-WIDE RECYCLING PROGRAMS

A Thesis
Submitted to the Graduate Faculty
of the
North Dakota State University
of Agriculture and Applied Science

By

Brian James Fier

In Partial Fulfillment of the Requirements
for the Degree of
MASTER OF SCIENCE

Major Department:
Natural Resources Management

March 2010

Fargo, North Dakota

North Dakota State University
Graduate School

Title

FACTORS INFLUENCING THE IMPLEMENTATION OF

COMMUNITY-WIDE RECYCLING PROGRAMS

By

BRIAN JAMES FIER

The Supervisory Committee certifies that this *disquisition* complies with North Dakota State University's regulations and meets the accepted standards for the degree of

MASTER OF SCIENCE

SUPERVISORY COMMITTEE:

Chair

Approved by Department Chair:

25 March 2010
Date   Signature

ABSTRACT

Fier, Brian James, M.S., Department of Natural Resources Management, College of Agriculture, Food Systems, and Natural Resources, North Dakota State University, March 2010. Factors Influencing the Implementation of Community-Wide Recycling Programs. Major Professor: Dr. Gary A. Goreham.

The purpose of this study was to determine how the social, economic, political, and administrative factors within a community influence the implementation of community-wide recycling programs. More specifically, this study examined how factors such as urban or rural character, population size, and public/private partnerships influence recycling decisions. The study explored the steps that could be taken to implement a community-wide recycling program and examined how factors such as the size of the community's population and its urban or rural nature influence decisions to implement community-wide recycling programs. A mixed methods approach, with a focus on interviews with recycling officials, was used to answer these questions.

Twenty-eight themes in eleven categories were identified. These thematic categories included factors influencing the implementation of successful recycling programs, social factors, economic/financial factors, administrative factors, partnerships, costs, and community structure. These themes relate directly to factors that influence the implementation of a recycling program; as such these factors must be considered when implementing a community-wide recycling program. Additionally, they should be taken into consideration within communities that already have a community-wide recycling program.

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDIX TABLES

xiv

LIST OF APPENDIX FIGURES

CHAPTER 1. INTRODUCTION

Recycling is the process of extracting useful substances from waste and reusing these substances. Community-wide recycling, recycling done on community scale, is a growing practice among many communities in the United States. According to the U.S. Environmental Protection Agency (EPA) (2006a, 2006b), solid waste in the U.S. has increased from 88.1 million tons in 1960 to 245.7 million tons in 2005. During the same time, recovery of materials for recycling increased from 5.6 million tons in 1960 to 58.4 million tons in 2005, a substantial increase. Recycling as a percent of total waste generated increased from 6.4% in 1960 to 23.8% in 2005.

Landfilling is a type of solid waste disposal. Typically, various layers of dirt bury the solid waste. According to the Environmental Protection Agency (2006a, 2006b) the number of landfills in the U.S. has been declining. In 1988, there were 7,924 landfills in the United States, in 2005 that number dropped to 1,654. In 2005, 54.3% of municipal solid waste was discarded, 32.1% was recovered, and 13.6% was disposed of by combustion with energy recovery.

Whereas community-wide recycling is a growing practice, many communities currently do not have community-wide recycling programs. This study will seek to find social, economic, political, and administrative factors that may influence decisions to implement or not implement community-wide recycling programs in Eastern North Dakota and Western Minnesota.

1

Research Questions

This study posed several questions that address the growth of community-wide recycling. First, what factors result in the implementation of successful recycling programs? This involves looking at communities that have implemented successful recycling programs and comparing them to communities that have no recycling programs and communities that have recently implemented recycling programs. This process seeks to identify factors that influence if a community will be successful in implementing a community-wide recycling program.

Second, what social, economic/financial, and administrative factors influence the decisions as to whether or not to implement community-wide recycling programs in communities of various sizes? Answering this question will help to explain the various internal and external factors that influence recycling programs within communities. It is important to analyze these factors to determine how they affect the decisions surrounding recycling programs. Some of the social factors related to recycling include community support, personal waste management practices, and social status. Economic and financial factors related to recycling pertain to recycling program costs, ability to sell recyclable materials, and the resources needed to implement a recycling program. Administrative factors such as labor requirements, organizational goals, statutes, policies, ideology, and bureaucracy could be issues that would affect recycling program decisions.

Third, what partnerships, costs, and community structures influence recycling program decisions? The unique qualities of urban and rural communities, community

2

size, and partnerships between government and private waste management organizations, affect the decisions to implement community-wide recycling programs.

Purpose

The purpose of this study is to determine how the social, economic, political, and administrative factors within a community influence the implementation of community-wide recycling programs. More specifically, this study explores how factors such as urban or rural character, population size, and public/private partnerships influence recycling decisions. In order to accomplish the purpose, the following objectives are set. This study will:

1. Explore what steps could be taken to implement a community-wide recycling program.

2. Examine how factors such as the size of the community's population and its urban or rural nature, influences decisions to implement community-wide recycling programs. In addition, it will consider social, economic/financial, and administrative factors.

Importance of the Study

The study of all of these factors is important for several reasons. First, it explores what factors have an influence over the establishment of recycling programs. Second, this study allows potential conclusions as to what methods work and what factors influence the implementation of community-wide recycling programs. This information is

3

applicable to other communities that are interested in starting recycling programs and it can help communities improve their current recycling programs.

The findings from this research are useful in several ways. Literature can be developed that would assist communities in establishing recycling programs. An outline of challenges, successes, and examples show what works and what may not work with recycling programs. The research provides a look into the impact of policies that promote recycling while discouraging pollution has on communities. How these and similar policies affect the communities and the decisions that community officials and administrators make in regards to recycling programs.

CHAPTER 2. LITERATURE REVIEW

Recycling is a broad and complex topic that must be analyzed from varying viewpoints to accurately understand the topic. This chapter presents, analyzes, and synthesizes recycling related literature from the environmental, financial, landfill, waste management, personal, and planning subject areas; these findings are outlined in Figure 1 below. Additionally, this chapter provides a look into decisions at the community level. Finally, this chapter outlines the gaps in the literature.
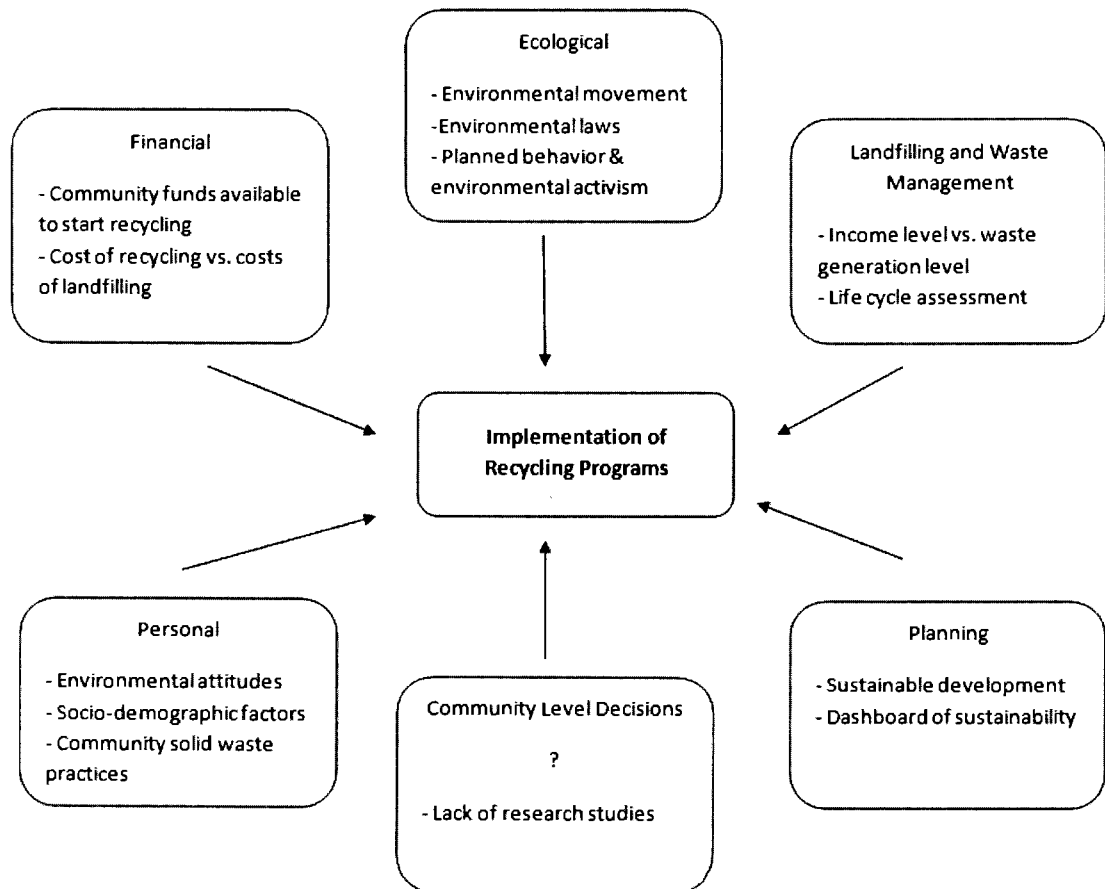
Figure 1. Factors Influencing the Implementation of Recycling Programs.

Ecological Factors Related to Recycling

One must consider various ecological factors when examining recycling. These factors range from the impact of environmental laws on recycling and waste management practices to the environmental movement and the correlation between planned behavior and environmental activism.

Several environmental laws exist that have an impact on recycling. These laws include the Clean Air Act of 1963 (1970) and the Clean Water Act of 1972 (1972); both of which affect the processes by which waste is disposed and further influences decisions whether or not to recycle. The Clean Air Act of 1963 and amendments limit waste disposal methods through provisions related to toxic air pollution, ozone depletion, and acid rain. The Clean Water Act of 1972 and amendments limits the impact of waste disposal on our surface and ground waters.

Recycling is an important part of the environmental movement, each relying on and being a part of the other. The environmental movement has consistently focused on protecting the environment. Recycling or reusing resources is typically associated with attempting to protect the environment by wasting fewer resources and limiting the consumption of natural resources.

The environmental movement has had a profound impact on laws and public attitude that affects recycling. Without the environmental movement, any recycling efforts today would likely be for very different reasons. According to Egri and Herman (2000), a new environmental movement phase began in the United States in the late

1960s after the publishing of the book *Silent Spring* (Carson, 1962) and the first Earth Day was held on April 22, 1970. These events, along with the implementation of organizations focused on saving endangered species, protecting natural resources, and evaluating our impact on the environment, helped propel the environmental movement forward.

An environmental resurgence began in the 1980s. Some of the pro-environmental practices that expanded during this time include environmentally sound buildings, the development of pollutant measuring technologies, the proliferation of recycling, and the rise of environmental impact studies. These practices illustrate the push to be more environmentally friendly or more "green" (Egri and Herman, 2000).

Whereas there is a positive correlation between the environmental movement public attitude and laws related to waste management and recycling, one must consider what motivates people to become involved in the environmental movement in the first place. Tonglet, Phillips, & Read (2004) used the theory of planned behavior to explore recycling behavior. They found that attitudes to recycle were the main determinant of recycling behavior. Tonglet, et al. (2004) further suggest that those developing recycling programs should reinforce positive views of recycling to those that are currently recycling and change negative views to positive views. The study also suggested that having the appropriate skills, opportunities, and resources to recycle is positively correlated with positive recycling attitudes. The recyclers in the study had positive views of recycling programs; they did not view the program as a waste of money, the program did not take up too much time or space, it was not too complicated, and it was not an inconvenience.

This suggests that recycling programs should be developed for convenience and with space and time being considered.

Tonglet, et al. found that "the specific attitudes that correlated the most strongly with recycling behaviour were: recycling is responsible, rewarding, sensible and good, and in addition the respondents demonstrated a concern for maintaining a good place to live" (Tonglet, et al., 2004, p211). Additionally, a concern for the community, previous recycling experience, and the consequences of recycling were also strong predictors of recycling behavior.

Oom Do Valle, Rebelo, Reis, and Menezes (2005) looked at recycling from several perspectives including the theory of planned behavior. They found that household members more influenced by social pressure had higher standards of recycling involvement. The role of specific knowledge and perceived convenience in perceived behavior control also supported the theory of planned behavior. Those with higher perceived behavior control were more aware of materials that can be recycled, hence they are more qualified to carry out the behavior. However, the correlation between recycling attitude and recycling participation was significant, but not positive.

More broadly, the theory of planned behavior can be applied to environmental activism. According to Fielding, McDonald, and Louis (2008) people can use the theory of planned behavior to evaluate intentions to engage in environmental activism. Within their research, they found a positive correlation between those involved in environmental groups and self-identity as an environmental activist and positive environmental activism

intentions. While related to environmental activism and not directly to recycling, one should consider a potential impact on recycling behavior.

Fielding, et al. (2008) found that those in environmental groups were more likely to become environmentally active. This correlation matches other findings of a positive correlation between group membership and activism (Hornsey, et al., 2006; McFarlane & Boxall, 2003; McFarlane & Hunt, 2006). Does the establishment of environmental groups that focus on recycling have a positive impact on the group members becoming recycling activists? Could such activism spread to other non-group members?

The level to which one self-identifies as an environmental activist correlates with their willingness to participate in environmental activism. These findings are consistent with identity theory and past research that has studied self-identity within the theory of planned behavior. Generally, the positive correlation between intentions and self-identity ranges from weak to strong, thus there is great variation in the strength of the correlation; however, Fielding, et al. found in their research that with environmental activism the positive correlation between identity and activism is strong (Fielding, et al., 2008).

Financial Factors Related to Recycling

Financial factors play an important role in recycling participation rates. These influencing factors range from community funds available to start recycling programs to the cost of recycling versus landfilling. This section will analyze how such factors influence the level of recycling adaptation within communities.

Highfill and McAsey (2000) modeled correlations between community size, municipality income level, and landfill and recycling usage. Their model suggests that more affluent municipalities are more likely to begin recycling programs earlier in a planning period than are less affluent municipalities. Furthermore, they found a positive correlation between community revenue and waste generation, recycling, and waste disposal. They referenced similar models that postulated that when income is constant, recycling increases and both consumption and landfilling fall over time. However, municipality income growth does not necessitate consumption growth, nor does it necessitate landfill growth. Within their model, they found that once started recycling will continue to grow over time. However, the pace will be slower than potential income growth, meaning as community income grows recycling may also grow, but at a slower rate. This trend continues until a landfill becomes full, at which time recycling and income will grow at the same rate.

It has been shown through modeling that more affluent municipalities are likely to recycle more than less affluent municipalities. Furthermore, municipalities that are more affluent will often institute recycling programs earlier in the planning horizon or will fill their landfill faster than less affluent municipalities. When comparing municipalities with similar income levels, the one with the larger landfill is likely to begin recycling at a later time than the municipality with the more limited landfill. However, one must take into consideration the fact that there may be times when municipalities only landfill, only

recycle, or do a combination of both. These changes can be purposeful to influence

recycling or specific waste management practices (Highfill and McAsey, 2000).

Highfill and McAsey (2000) hypothesized that a municipality with a small initial

income, or income that is available for community services use, will landfill exclusively

during the planning horizon and will not fill their landfill as they do not have the resources

to consume to the level that would fill their landfill. Hence, they are not required to do

anything except landfill. Further, municipalities with a little more initial income will find

that they need to recycle a little more, but will not switch to recycling-only. They will

follow a landfilling-mixed solution path, meaning that they spend funds on both landfilling

and recycling. Moving up the hypothetical income line, the municipality will have enough

initial income to implement a phase of recycling-only, following a landfilling-mixed-

recycling path. Further up on the income line a municipality would have a mixed solution

than recycling, a mixed-recycling solution. Finally, near the top, a municipality with a high

initial income will only recycle, using a recycling-only solution. Hypothetically, these

municipalities, near the top, have enough income that the utility of recycling outweighs

the costs associated with recycling. Due to the high level of municipality income, there is

a high level of consumption and waste production. These findings are roughly consistent

with the "green glass–brown glass" phenomenon where green glass (wine bottles) are

associated with higher income municipalities and brown glass is consistent with lower

income municipalities; these findings hold true whether or not a landfill is full.

Highfill and McAsey (2000) note that this waste-management/recycling utility function is most relevant to municipalities with smaller initial incomes. These smaller municipalities typically have access to landfills with relatively high levels of space. Hence, a landfilling or landfilling and mixed solution, meaning waste is recycled and landfilled, may be the best for the community. The larger municipalities with higher income and lower landfill space availability may find a declining marginal utility of recycling more appropriate.

The user cost of these options, influenced by the level of initial income, must be taken into consideration. For example, a municipality with a higher level of initial income may have a lower user cost than a municipality with a lower initial income. In this example, the municipality with the higher level of initial income places a lower value on marginal increases in landfill usage (Highfill and McAsey, 2000).

Lund (1990) examined recycling and waste management specifically as an economic factor rather than an environmental factor using a simple linear programming method. The Merriam-Webster dictionary (2010) defines linear programming as "a mathematical method of solving practical problems (as the allocation of resources) by means of linear functions where the variables involved are subject to constraints." Recycling and waste management costs were studied and compared to the total present value cost of offering solid waste disposal services. The premise was to look into the indefinite future and defer landfill closure and replacement costs by making use of secondary materials markets, recycling. Lund suggested that even if materials to be

recycled were sold at a loss, the effect it had on deferring landfill closure and replacement costs can help support the recycling argument. This cost savings is without taking into account other motivations, especially the desire to minimize negative environmental impacts, which can support the recycling decision. Both the costs associated with solid waste disposal (e.g., landfill operation, landfill closure, and the siting of new landfills and related buildings) and the costs of recycling (e.g., collecting, processing, and selling recycled material) need to be taken into consideration.

A community should consider the costs associated with recycling and landfilling once implementation has occurred. Lund (1990) suggested that the recycling market might become saturated with recycling materials if a large municipality undertakes a recycling program. This may drive down the purchase price of the recycling materials. These factors will have an influence on the amount of money it costs to run a recycling or solid waste management program.

From another perspective, household demand for recycling services affects community-recycling rates. Palatnik, Ayalon, and Shechter (2005) examined this issue taking into consideration the use of economic incentives to promote specific waste management practices. Palatnik, et al. (2005) sought to gain a better understanding of the need for recycling subsidization and how it correlated with an individual's willingness and desire to recycle as well as the individual's negative perceptions of landfilling. The conclusions were based on specific household behavior as a result of an increase in waste disposal costs and their willingness to pay for various waste disposal services.

13

Palatnik, et al. (2005) found that when low levels of effort were needed for curbside recycling, households' participation rates were mainly influenced by economic variables, age, and the households' willingness to pay a higher price for the recycling program. However, when the effort level required to recycle was high, households were less willing to pay and the recycling participation decisions were based more strongly on their environmental commitment and economic considerations. In both cases, a subsidy was needed to achieve an efficient level of recycling.

When studying factors influencing solid waste management one should also account for the cost of reducing solid waste. Palmer, Sigman, and Walls (1997) studied three price-based policies for solid waste reduction: deposit/refunds, advance disposal fees, and recycling subsidies. Their findings at the time suggested that a deposit/refunds approach would be significantly less costly than the advance disposal fee or recycling subsidies method. However, high administration costs can make advance disposal fees more attractive.

Landfilling and Waste Management Related to Recycling

Landfill and waste management processes and procedures influence recycling practices. Research reveals that a positive correlation between income level and waste generation level exists. Life cycle assessment techniques relating to curbside recycling, landfilling, or incineration with energy recovery need to be taken into consideration. Life cycle assessment techniques refers to the costs and environmental impacts a product has

14

over its lifetime One must also consider the recycling of products that are the result of demolition and how these materials can avoid the landfill.

Morris (2005) found that recycling newspaper, mixed paper, bottles, cans, and other recoverable materials found in household and business municipal solid waste consume less energy than disposal in a landfill or by incineration. Additionally, recycling had less of an environmental impact than does the disposal of these materials in a landfill or by incineration. This was true even when taking into account energy recovered through the disposal process. Morris came to these conclusions by calculating the life cycle of the various recyclable items.

Many of the positive impacts, financial and environmental, relate to the energy savings as a result of recycling materials. Using raw materials to develop new products is more energy intensive. When recycling over landfilling, reductions in green house gases, acidification and eutrophication, potential human health impacts, and potential ecological impacts are noted (Morris 2005).

Roussat, Dujet, and Méhu (2008) used a multi-criteria decision analysis method, ELECTRE III, to help determine the best methods of sustainably dealing with solid demolition waste. According to Pena, Rebollo, Oliveras, and Oliveras (2007) "ELECTRE III starts with a finite set of actions evaluated on a consistent family of pseudo-criteria and aggregates these partial preferences into a fuzzy outranking relation." Roussat, et al. (2008) took into account sustainable development processes in regards to economics, environmental consequences, and social issues and related them to nine alternative

15

demolition waste management practices. Energy consumption, depletion of abiotic resources, global warming, dispersion of dangerous substances, economic impacts, employment factors, and quality of life were used as qualifiers to determine the various impacts of each type of solid demolition waste management practice.

It was found that selective deconstruction, the removal of hazardous and non-hazardous materials from buildings prior to demolition, was an important step in sustainable demolition waste management. This finding supports the separation of the various types of wastes found during building demolition; such separation allows for more sustainable practices including the recycling of materials recovered during demolition in a more effective way (Roussat, et al., 2008).

Personal Characteristics Related to Recycling

Various personal characteristics have an impact on environmental behavior and recycling participation. These characteristics include environmental attitudes impact on recycling, recycling knowledge, and content specific motivations for or against recycling. The later can be used to discriminate between frequent and infrequent recyclers. Furthermore, various socio-demographic factors, motivation factors, and to a much lesser extent, community solid waste management practices, influence personal recycling levels.

Derksen and Gartrell (1993) found that people who have access to a structured recycling program are much more likely to recycle than those without a structured recycling program are. Personal attitudes towards environmental factors only have an impact on recycling within communities when a structured recycling program is in place.

Whereas positive views on environmentalism enhance recycling when a structured

recycling program is present, the positive view alone cannot overcome the lack of a

structured recycling program within the community in enhancing recycling participation

levels. Various other factors have been identified that influence recycling participation

levels including a focus on non-monetary motives (De Young, 1990), recycling prompt

styles (Hopper and Nielsen, 1991), and to a lesser extent age (Vining and Ebreo 1990;

Derksen and Gartrell 1993).

Several personal attributes have an impact on recycling decisions at the individual

level. Through his study of conservation, De Young (1986) found positive correlations

between intrinsic motives, such as frugality, the ability to help make a difference in the

long run, and the satisfaction of having the luxuries of material benefits, and recycling

participation. De Young further suggests that people may undertake conservation

activities, such as recycling, for personal satisfaction from the activity as opposed to for

some external reward.

Shalom H. Schwartz (1968a, 1968b, 1970, 1973, 1977) developed a model of

altruistic behavior that described the behavior that most people would acknowledge a

norm, but they would not necessarily follow the norm. Hopper and Nielsen (1991) found

that recycling is an altruistic behavior. Based on the Schwartz model of altruistic

behavior, it was determined that recycling behavior is influenced by the perceived social

norm to recycle when the personal norm to recycle was present and awareness of

consequences was high. Hopper and Nielsen also found that more than simple reminders

17

and informational brochures are needed to influence attitudes. Social interventions (e.g. modeling, talking, block leadership) that influence how norms are shaped are essential. Additionally, block leaders, those people who attempt to influence behavior through interpersonal contact, are important in promoting recycling behavior. Regular prompting increased recycling behavior. The combination of prompting and providing information proved to be effective. Additionally, the study showed that block leaders had an impact on both norms and behavior. Seemingly, behavior changed in spite of attitudes, possibly through behavioral modeling and imitation. Finally, purposefully introducing social interaction (e.g. recycling events, community information/discussion campaigns, block leaders) around recycling can substantially increase recycling behavior.

De Young (1990) found that motives such as the desire to help conserve natural resources, recycling to support charity, and recycling because it is the right thing to do far outweighed the desire to recycle for monetary gains. Recycling to earn money was clearly not a strong motive for the majority of survey respondents in De Young's research.

Oskamp, Harrington, Edwards, Sherwood, Okuda, and Swanson (1991) studied a curbside recycling program in Ontario, California and found that homeowners and those living in single-family dwellings was a strong predictor in recycling participation rates. Further, it was found that those that have friends and neighbors who recycle are more likely to recycle, this is due to the visibility of recycling and its effect as a modeling stimulus. Acknowledgment of environmental problems and intrinsic motives to recycle were also significant predictors for recycling participation. Interestingly, Oskamp et al.

18

found that there was a negative relationship with pro-ecology attitudes in general and other environmentally responsible behaviors.

Derksen and Gartrell (1993) found that urban residents are much more likely to recycle cans and bottles than rural people are. Urban residents are more likely to recycle newspapers, plastic, milk cartons, food cans, and other types of paper than rural people are. A strong positive correlation between recycling behavior and area of residence variables was found. A positive but weak correlation between recycling behavior and age was present, the same held true for education. Income and job prestige did not predict recycling.

Palatnik, Ayalon, and Shechter (2005) studied the correlation between economic incentives and solid waste management practices. They found that as the price of waste disposal services rose, the socioeconomic status of the household became a more important factor in determining whether the household should purchase a recycling container. Additionally, as the effort level required to recycle rises, the willingness to pay falls as does the participation levels. Finally, as the effort required to participate in the recycling program rises environmental awareness becomes a more important factor in determining willingness to participate in a recycling program.

Howenstine (1993) studied recycling based on the perceptions, opinions, and behaviors of Chicago residents related to recycling practices to gain a better idea of planning a recycling program. Howenstine states that the decision to recycle is contingent upon whether or not a set of conditions is met. Some of the conditions include sufficient

19

motivation, knowledge, and the ability to overcome inconveniences associated with recycling. All of these conditions are in line with the findings in other research. The motivation may come in the form of a financial benefit, though this has little lasting effect (De Young, 1986). The motivation can be altruistic (De Young, 1986; Hopper and Nielsen, 1991). Social pressure can have an impact on willingness to participate in recycling programs. Knowledge of how to participate in the recycling process is one of the largest factors in determining participation levels; if people do not know how to recycle, they are less likely to participate.

Urban and Planning Factors Related to Recycling

Sustainable development, the process of working to meet human needs in an environmentally friendly manner, is a growing practice in community planning and relates directly to waste management and recycling. Planning through the Dashboard of Sustainability, a mathematical and graphical tool used to integrate various factors related to sustainability, is a useful tool during the decision making process as it helps to bring several topical areas together. This tool can be used to aid in developing a more sustainable community.

Scipioni, Mazzi, Mason, and Manzardo (2008) applied the Dashboard of Sustainability to the city of Padua, Italy to gather information about environmental protection, economic development, and social promotion. Several indictors were selected in the following areas to determine the progress of environmental sustainability: environmental indicators, economic indicators, social indicators, and health board-justice

indicators. Specific factors related to these indicators are able to be put into the Dashboard of Sustainability and conclusions related to best practices are able to be determined. This process allowed for sustainable economic development as it identified areas that posed a problem and areas of strength. This can be applied to recycling and related factors, such application may better enable communities to solve issues and produce a more effective program.

Recycling is a very broad and complex topic that must analyzed from varying viewpoints to be able to accurately understand the topic. This chapter provided a review of literature related to environmental, financial, landfill, waste management, personal, and urban and planning factors and their impact recycling programs. All of these things should be taken into consideration anytime topics relating to recycling arise as they can have a profound impact on recycling participation levels.

Community Level Decisions

Unlike the previous perspectives, there is little research at the community, county, and regional levels of decision. Much of the research that has been done to provide any perspective into decisions at these levels was by way of pilot program studies and community evaluations. However, there have been some implied positive correlations between these levels and the perspectives previously outlined. No study could be found that looked at what factors result in the implementation of successful recycling programs; specifics related social, economic, political, and administrative factors at the community

21

levels and their influence on recycling; and how challenges, costs, and community structures influence recycling program decisions.

Gaps in the Literature

Through extensive review of literature related to recycling, it has been concluded that much of the available literature relates directly to the individual level of analysis. There is a lack of information about recycling practices at the macro levels of community, county, and regional, beyond pilot program studies and community evaluations. Available literature primarily focuses on the decisions and processes that aid in the determination if a specific individual or group of individuals will recycle or not. Such literature and findings do not specifically address why communities or other entities decide to implement comprehensive recycling programs. The intention of this study is to gather information from communities and counties to begin to identify the reasons why the community or county implement comprehensive recycling programs, including curbside side recycling programs. Literature related to financial, landfill, waste management, personal, and planning subject areas are used to supplement findings at the macro levels.

Additionally, information was lacking that detailed processes and procedures that affected communities' decisions to implement comprehensive recycling programs, as well as challenges and successes related to the implementation of such programs. Information was not readily available related to the actual steps communities took in implementing comprehensive recycling programs. Reviews of processes, procedures, and steps taken and their result were not readily available.

22

CHAPTER 3. THEORY

Recycling, the implementation of community-wide recycling programs, and related factors can be studied from the rational choice theory. This theory includes several concepts that are applicable to the study of factors that influence the implementation of community-wide recycling programs. This chapter will provide an overview of this theory and its applicability to recycling decisions.

Rational Choice Theory

Green (2002) describes Rational Choice Theory as a means social scientists use to understand human behavior. Rational choice theory traces its roots back to its use in economics, where it was a prominent paradigm. More recently, rational choice theory has become more popular in the areas of sociology, political science, and anthropology.

Rational Choice Theory has several assumptions. Rational Choice Theory is choice behavior an individual makes. The theory suggests that the individual's decision will be characteristic of that of a larger group. Once the decision is established, the theory analyzes how the individual's choices will result in various outcomes (Green, 2002).

One should consider how the individual makes his or her decisions. Rational choice theory suggests that the individual would make their decision based on the choices that would best help them achieve their objectives. People will do their best under the current circumstances (Green, 2002). Hechter and Kanazawa (1997) suggest that rational choice theory is more concerned with social outcomes rather than individual outcomes. They emphasize that an individual's behavior is only predictable if we know what

23

motivates them. If we know what motivates people to recycle we can use this concept to better determine an individual's behavior related to various recycling processes. Based on this theory, if we are able to identify an individual's behavior we are able to predict community behavior related to recycling decisions.

Green (2002) describes several important concepts related to rational choice theory including maximizing utility, awareness of constraints, environment, consistency, and equilibrium. Maximizing utility is the process of choosing the favored alternative. Awareness of constraints is the knowledge that a choice must be made and that this results in tradeoffs with alternate choices. The individual or individuals will make assumptions about the environment in which choices are made, how the environment can affect their decisions. Analysis of rational choice results in findings of consistency among unrelated agents. If an individual maximizes subject to constraints equilibrium will result (Green, 2002). The concepts of maximizing utility, awareness of constraints, environment, consistency, and equilibrium can all be applied to the processes related to implementing community-wide recycling programs.

Maximizing utility relates to choosing the favored alternative meaning that the individual, community officials, or the community as a whole may simply pick recycling or one of its alternatives because of the perception of specific costs and benefits. The self-interest costs and benefits can differ from the community costs and benefits of recycling; this can result in the most effective solution not being selected due to personal and/or community self-interest. The choice of some may have an impact on others.

24

Awareness of constraints is the knowledge that decisions must be made and with

every decision there is a tradeoff. This concept could affect the decision to implement

recycling programs on several levels. On the individual citizen level, the decision to

recycle could have tradeoffs related to time, cost, and physical energy required to recycle.

At the community official level, decisions of implementation can be related to tradeoffs

such as those in financial, political, or administrative areas. Such tradeoffs could influence

the decision to implement a community-wide recycling program or not. These tradeoffs

carry to the community level. At the community level, decisions can have tradeoffs

related not only to financial, political, and administrative factors, but also to employment

in the community, public perceptions, and other factors.

The concept of the environmental context suggests that individual(s) will make

assumptions about the environment in which choices are made (e.g. the impact of social

constructs on decisions). The environment will affect their decisions. This can be directly

applied to this study in that the social constructs that are currently present in a

community (e.g. structured recycling programs, block leaders) can influence an individual

decision to recycle or not. Additionally, this concept can be applied to other levels, such

as the community official level, in which political or other pressures influence community

officials.

Additionally, rational choice theory describes a situation where "the choices of

different agents are made consistent with one another. A situation with consistent

choices in which each agent is optimizing subject to constraints is called equilibrium"

25

(Green, 2002: 8). This would suggest that recycling decisions should be consistent and not opposed to other decisions (e.g. decisions promoting waste generation reduction as opposed to decisions resulting in the frivolous generation of waste). Such decisions should be complementary. For example the decision to reduce waste is consistent with the implementation of a recycling program.

As was outlined there are various ways that rational choice theory can be applied to this research. These concepts will be guiding principles throughout this study. This theory provides a framework to help explain some of the behaviors and decisions related to recycling.

CHAPTER 4. METHODS

Within this study, four counties in two states were analyzed for their experiences related to comprehensive recycling programs. Three of the counties are more urbanized and one is more rural. Within two of the urbanized counties, larger and smaller cities were studied for their opinions related to comprehensive recycling programs. Within the third urbanized county a larger city was studied. The rural county has smaller, more rural towns.

The first urban county is Cass County, North Dakota. Cass County includes the larger city of Fargo and the smaller cities of West Fargo and Tower City. The second urban county is Grand Forks County, North Dakota. Grand Forks County includes the larger city of Grand Forks. The third urban county is Clay County, Minnesota. Clay County includes the larger city of Moorhead and the smaller cities of Dilworth, Glyndon, Hawley, and Georgetown. The rural county is Becker County, Minnesota. Becker County includes the city of Detroit Lakes. Several other smaller communities in Clay County and Becker County were studied by use of quantitative recycling data. Figure 2, below, outlines the geographic location of these communities.

The levels of analysis includes the community level (the city, county, or institution), the organization level (the city government), and the individual level (the city officials). A mixed method approach[1] is used. This approach includes interviews with city

---

[1] A mixed methods approach uses a combination of qualitative and quantitative research including data from one or more studies (Creswell and Plano Clark, 2007).

27

officials, other stakeholders, and the collection of secondary, documentary, and

photographic data. Initially, purposive sampling[2] was used; snowball sampling[3] was also

used to ensure that a sample representative of the interests of stakeholders was included

in the study.
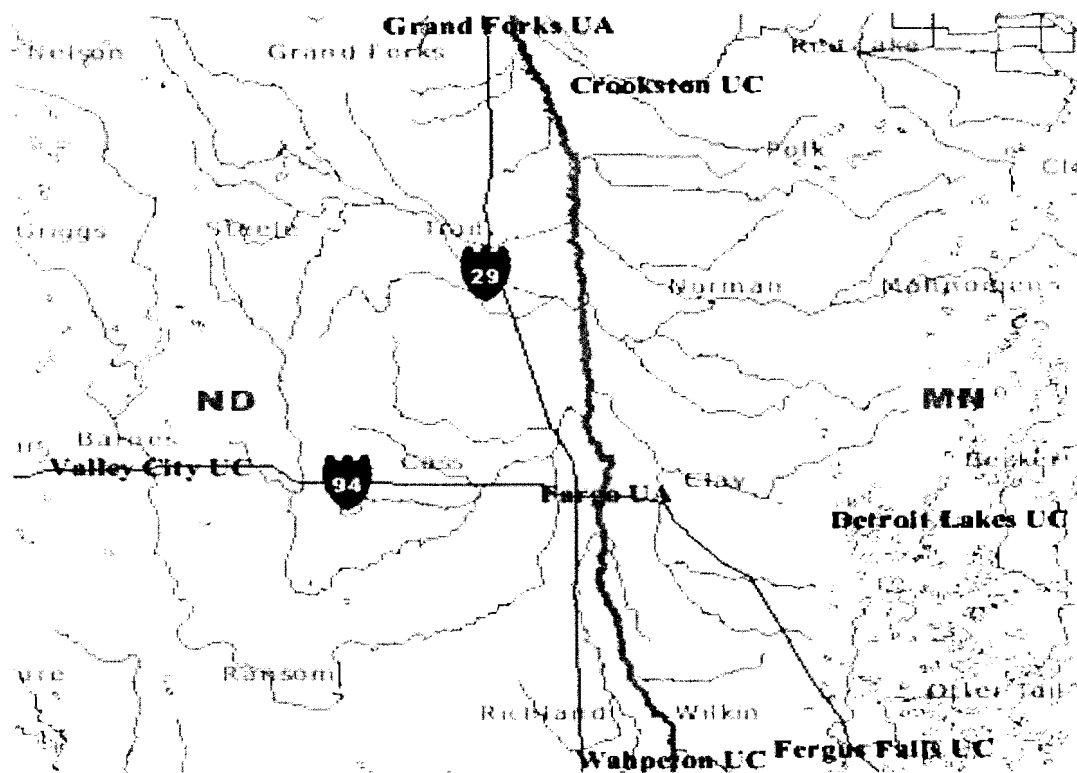
Figure 2. Cass County & Grand Forks County, ND; Becker County & Clay County, MN.
Source: U.S. Census Bureau, 2010.

Steps were taken to avoid misinterpretation of data within this study. Data

analysis includes methods to assess data consistency within the community, comparison

---

[2] Purposive sampling involves using researcher knowledge to select (interview) subjects who represent a population (Berg, 2009).

[3] Snowball sampling involves initially identifying several potential interviewees and using them as references to find additional potential interviewees (Berg, 2009).

and contrast across communities, and comparison and contrast between the communities studied and previous research studies related to recycling and waste management. Data analysis processes include data reduction, data display, and conclusions and verification methods as is described by Berg (2009). Triangulation is used to make correlations between the various types of data that were collected.

Independent variables include factors such as community financial resources, political influence, and administrative factors. The dependant variables include the recycling stage at which a community is in as well as the level of success a community has had in implementing a community-wide recycling program.

Timeline

April 2009: Identification of initial stakeholder contacts.

May - August 2009: Interviews and data collection.

August 2009 - September 2009: Interviews, interview follow-ups as needed, analysis of interviews, additional data collection.

October 2009: Analysis of interviews.

November 2009: Additional data collection, analysis of data.

December 2009: Findings and discussion write up.

January 2010: Findings and discussion write up.

February 2010: Follow up and analysis of interviews, findings, discussion, and conclusion write up.

March 2010: Thesis completion and defense

Interview Data

Data acquired through interviews is the primary data source within this study. Interviews took place over several months in 2009 and in February 2010, interview dates were based around the availability of community officials. Interview lengths varied however, most interviews were approximately one hour in length. Interviews typically took place at the interviewee's place of employment; however, several phone interviews were conducted.

In each community, community official(s) were interviewed to gain a diverse, comprehensive view of various attributes that help to determine community-wide recycling practices. Additionally, others involved in recycling and waste management practices in these communities were interviewed. People in the communities listed below (Table 1) were interviewed, as they are stakeholders within the community.

Several potential interview questions for community officials and others involved in recycling or waste management have been developed (See Appendix B). Such questions are aimed at gathering information about why communities may or may not have started community-wide recycling programs. Other questions pertain to the opportunities they found and the challenges they faced and how the challenges were addressed.

Table 1. Primary Communities Studied.

Community	Community Type	Population [4][5]
Cass County, North Dakota		
Fargo	Urban Large City	96,293
West Fargo	Urban Medium City	21,516
Tower City	Rural Small City	252
Grand Forks County, North Dakota		
Grand Forks	Urban Large City	50,778
Clay County, Minnesota		
Moorhead	Urban Large City	35,084
Dilworth	Rural Small City	3,001*
Glyndon	Rural Small City	1,049*
Hawley	Rural Small City	1,882*
Georgetown	Rural Small City	125*
Becker County, Minnesota		
Detroit Lakes	Rural Medium City	7,348

Interviews were audio recorded and supplemented with notes. The interviews were transcribed and coded using emergent theme content analysis in which different

---

[4] Population refers to that of the U.S. Census Bureau, 2006-2008 American Community Survey, except in Tower City, Dilworth, Glyndon, Hawley, Georgetown, and Detroit Lakes, all of which use the U.S. Census Bureau, 2000 Census.

[5] Communities delimitated with a * refer to community populations based on the U.S. Census Bureau's identification of populations within the city limits.

colors were used to note various themes. The themes that emerged were further

analyzed and compared to other findings of secondary data, documentary data,

photographic data.

Secondary Data

Within this study various sources of secondary data were used. Secondary data

relates to research that has been done in regard to recycling and related practices, much

of what was outlined in the literature review. Census data, surveys, and additional

information related to recycling and waste management that was developed for the

communities being studied was used.

Documentary Data

Documentary data, including government documents, meeting minutes, memos,

memorandums of agreement, contracts, newspaper articles, advertising material,

materials distributed throughout the community, and other documents related to

community recycling and waste management decisions were gathered. Such data

supplements interviews and other data collected. These data allow for a better

understanding of decisions related to the implementation of community-wide recycling

programs within each community.

Photographic Data

As a means of better understanding the dynamics within the communities that

were studied, photographic data were obtained. Such data shows current recycling and

waste management practices as well as potential changes within the communities. Such

data includes landfills, transfer stations, recycling facilities, and waste management bins.

Data Analysis

Post data collection, content analysis was used to analyze the various types of data

collected. The content analysis process sought to identify patterns, themes, biases, and

meanings, as is described by Berg (2009). First, the data were analyzed at the individual

community level for consistency across data and data types. This process sought to find

common themes related to decisions, changes in decisions, and other information that

was used in guiding decision-making processes, as well as if the data and decisions

changed over time. Types, processes, relationships, and systems were identified.

Second, the data were compared and contrasted across communities. This

included both rural and urban communities. This comparison and contrast process was

used to determine if data and decisions in one community are similar or different to that

of another community. Additionally, it sought to identify why there are these similarities

and/or differences.

In the third stage of data analysis, the data were compared to findings in the

review of recycling and waste management literature. The focus of this comparison is

based on communities and their decisions related to recycling. Similarities and

differences were noted.

Triangulation was used to bring the various types of findings together. Findings

from interviews, secondary data, documentary data, and photographic data were brought

33

together to be analyzed as is described above. This mixed methods approach allowed for corroboration of findings across various types of data.

Methodological Issues

Several methodological issues exist. There was considerable difficulty identifying and contacting specific points of contact within communities that may be of assistance. Difficulties related to scheduling an interview were present. Some community officials were simply not interested in talking to this researcher about recycling and waste management in their community. Acquisition of some specific facts and knowledge was difficult in some communities. This difficulty is attributable to either recycling processes and decisions occurring before the interviewee was in their position or the interviewee simply not knowing the answers to the questions posed.

The communities studied have different structures that can lead to different interview and data acquisition possibilities. This study heavily relies on interviews of community officials, which can result in skewed data due to availability, personal biases, and subject matter knowledge. Issues related to logistics, the mixed-methods format, data analysis, and triangulation also pose issues.

Ethical Issues

Ethical issues exist related to interviewee privacy and informed consent. The North Dakota State University Institutional Review Board is used as a guide to ensure ethical issues are taken into consideration. Privacy concerns related to interviewee identifiable information are present. Steps are taken to reduce the instance of

34

identifiable information. As such, a limited number of quotations are available

throughout this document.

CHAPTER 5. FACTORS INFLUENCING THE IMPLEMENTATION OF SUCCESSFUL RECYCLING PROGRAMS

Themes related to factors that influenced the implementation of successful recycling programs include the identification of what constitutes a "successful" recycling program, products recycled, recycling facilities and equipment, the development of recycling markets, and strategies to encourage community-wide recycling (Figure 3). The specifics surrounding these themes directly influence the implementation of recycling programs. The following factors were found through the study of various urban and rural communities.

Figure 3. Factors Resulting in the Implementation of Successful Recycling Programs.

What Constitutes a "Successful" Recycling Program?

One must first define what constitutes a "successful" recycling program. While the exact definition of this varied within the communities studied, there were several commonalties among several communities. Community ownership, public participation, societal influences, and education were all listed as factors that were used for defining success. Because these factors can help determine the success of a recycling program, they are also important in understanding how a recycling program can be developed.

Community Ownership

Community ownership is essential for the success of a recycling program. You can request that people recycle, you can try to tell people to recycle, you can even create ordinances that require people to recycle, but unless you have community ownership you will not have an effective and successful recycling program. Community members have to take ownership of the recycling program and want to recycle, they have to feel like they are part of the bigger picture and making a difference. Community ownership is essential in developing and maintaining a successful recycling program.

Public Participation

Public participation goes hand in hand with community ownership. All the recycling bins in the world could be made available, but if you don't have people interested in recycling then you will not have a successful program. Starting and building public participation is a complex process, but it is a required process. Whereas public

participation is directly related to community ownership, it is also greatly affected by societal influence and recycling education in the community.

Societal Influences

Recyclers encouraging others to recycle was a common theme in many of the communities studied. Additionally, several community officials stated that recycling in general is becoming more acceptable, it is becoming a more desirable behavior. Both of these factors play directly into the success of a recycling program.

Education

Education and information related to recycling was one of the most important parts of developing and ensuring the continuality of a successful recycling program. Education and information is imperative when describing how to recycle, what can be recycled, the benefits of recycling, why people should recycle, and various other related pieces of information. A person must first know how to recycle and what they can recycle before they can recycle. Ensuring that people know the process and what can be recycled in essential in ensuring that the proper materials are recycled and contamination is kept to a minimum. Appendix C provides various pieces of educational material that can be used as a model for developing educational material in other communities.

Products Recycled

Determining the products that will be collected for recycling purposes is essential in developing a successful program. Materials that are collected must be marketable. Within the communities studied, the most common materials that are collected include

food and beverage glass, plastics 1 and 2, cardboard, news and office paper, and metal

food and beverage cans. These are the most common materials collected because they

include some of the most marketable products. Several community officials made note

that the amount of space available can influence the type of products recycled. In some

areas, space limits will affect what materials can be collected.

Recycling Facilities and Equipment

Several methods can be employed to collect recyclables. Each method has

advantages and disadvantages and requires various types of facilities and equipment.

Several types of recycling collection facilities and equipment exist in the communities

studied including recycling sheds, drop-off sites, curbside bins, and combinations of these

types.

<u>Recycling Sheds</u>

The use of sheds to collect recyclable materials is common throughout nearly half

of the communities studied. Recycling sheds are most common in rural areas. These

sheds were originally implemented for cost saving purposes and for the ease of

constructing such structures. Though the sheds varied, as can be seen in Figure 4 and

Figure 5 below, they both serve the same basic purpose, to provide a dry and clean area

to drop off recyclable materials.

Drop-Off Sites

Drop-off sites are similar to sheds; however, they are typically dumpsters (Figure 6) or igloo type containers (Figure 7). This type is common due to their ease of hauling and ease of implementation.

Curbside Bins

Curbside recycling bins were common in four communities studied. Curbside collection was more common in larger communities; however, curbside collection did exist in smaller communities. Figure 8 and Figure 9 below show examples of the various types of curbside recycling bins.

Figure 4. An Example of a Recycling Shed within a Community.
Source: Fier, 2010.

Figure 5. A Recycling Shed that Makes use of Large Barrels to Store Recyclables.
Source: Fier, 2009.

Figure 6. A Typical Dumpster-Style Recycling Container.
Source: Fier, 2009.

Figure 7. Igloo Type Recycling Container for Brown Glass.
Source: Fier, 2010.

Figure 8. A Curbside Recycling Bin that Collects all Recyclable Material.
Source: Fier, 2010.

Figure 9. A Source Separated Curbside Recycling Bin.
Source: Fier, 2010.

The Development of Recycling Markets

Within the communities studied, the recyclable processor has an unquestionable

impact on recycling decisions within the communities. If the processor is unable to

market certain recyclable materials then it does not make sense to collect this product. If

markets cannot be established then effective and "successful" recycling programs cannot

be developed.

Strategies to Encourage Community-Wide Recycling

Recycling officials in various communities suggested several means for

encouraging recycling behavior among residents in their communities. The strategies

included financial incentives, availability and convenience, and educational and

informational campaigns.

Financial Incentives

Within three of the communities studied, money was used as a specific tool to encourage recycling. These communities offered recycling services at no additional cost but charged for the collection of solid waste based on volume. This practice encouraged community members to recycle because it would save the community member money. All of the other communities studied encouraged recycling financially by not charging for recycling but by charging for waste collection via various means including taxes, tipping fees, and assessments.

Availability and Convenience

The availability of recycling collection sites and the convenience of recycling was a common theme in the communities studied. Recycling officials described improved participation rates as the convenience of recycling improved. Several officials said they could see the differences. Those with recycling opportunities nearby recycle more, especially those with curbside bins. Additionally, as the availability of recycling means rose participation also rose. When asked what factors influence recycling participation one recycling official simply exclaimed "opportunity" (RO1). A recycling official also stated inconvenience as a reason some people do not recycle. Another recycling official in a completely different area noted these sentiments:

> Actually, by offering the curbside programs citywide you will definitely see an increase in participation rates. We will see more people recycle if it is convenient for them (RO11).

44

Convenience and infrastructure were two of the factors listed when another recycling official was asked about factors influencing recycling in communities.

> Some people just think of it as an inconvenience. Some people recycle because the infrastructure is there, for the betterment of society, and because they understand the larger picture and some people say what's in it for me. They don't care about society as a whole (RO1).

Educational and Informational Campaigns

Educational and informational campaigns were the most common means used to encourage recycling. The educational and information campaigns included educating various groups of people, providing information to various groups within the community, as well as educating community members about how to recycle and why recycling is important. Recycling officials described these processes as an absolute in developing recycling programs.

Educating people on the importance of recycling, how to recycle, and why they should recycle was key. Educational processes targeted people of all ages. Several communities focused on students in elementary school. This focus was both to help develop lifelong recyclers that are good stewards of the environment, but also because these young students will bring their knowledge and excitement for recycling home where they will encourage positive recycling behavior. In addition to targeting elementary students, high school and college students were also targets, as well as civic groups, working families, and various other groups. A holistic approach incorporating all members of the community was a common approach to education.

45

Student and civic groups also proved to be great resources for educating the communities about recycling. In both urban and rural, large and small communities studied student and civic groups provided educational programs and information related to the benefits of recycling. These groups were essential in encouraging recycling activities.

The availability of information related to what can be recycled, how to recycle, and related processes was pivotal in helping to encourage recycling behavior. Several community officials stated that without the information recycling would not be available because many people would not know how to recycle or what can be recycled. Information is key.

In summary, various factors can influence the implementation of a successful. As was outlined previously, what constitutes a "successful" recycling program must be determined; the goals must be established. The determination of products that are to be recycled, how they will be collected, and their marketability are important steps. Without these steps, you cannot have a recycling program. Finally, various strategies to encourage community-wide recycling were presented, these strategies are essential for the development of a successful recycling program. In the next chapter, this study will look at how social, economic/financial, and administrative factors influence decisions related to recycling programs, during both the implementation phase and during the operation of a recycling program.

CHAPTER 6. SOCIAL, ECONOMIC/FINANCIAL, AND ADMINISTRATIVE FACTORS

Eleven themes, covering a vast set of attributes, were identified in relation to social, economic/financial, and administrative factors that influence community-wide recycling program decisions. These themes ranged from age related socio-demographic factors to the availability of community funds to recycling advocates to recycling ordinances and policies. All of these factors played varying roles affecting community-wide recycling programs in the communities studied.

Social Factors

Several factors that related to social factors that influenced community-wide recycling program decisions were present (Figure 10). Social-demographic factors related to age, as well as community recycling advocates that influence community-wide recycling program decisions were identified.
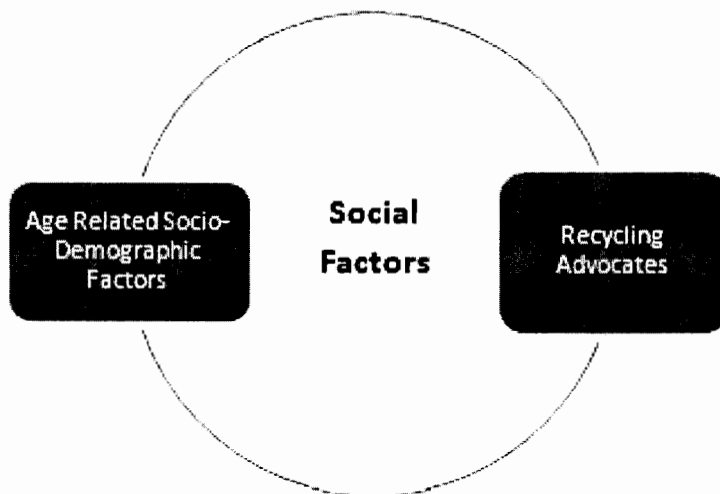
Figure 10. Social Factors.

Age Related Socio-Demographic Factors

Within various communities studied, recycling officials stated that they have noted that age plays a factor in recycling decisions. The situation described usually involved those in the middle range, people in their 30s, 40s, and 50s, as being the people least likely to recycle. Young children were very apt to recycling due to their exposure to recycling in school. High school and college students were also more likely to recycle because many had grown up recycling or were exposed to recycling in school or through friends. Older people, often those retired were said to recycle more often than those in the middle range. This was often described as having to do with time availability, thriftiness developed through life experiences, and exposure to recycling. One recycling official described similar sentiments:

> It seems to be that the younger generation from say college age down are very apt to recycle currently and the older, the elderly, anybody 55 and over are more likely. That middle range is by far the hardest to reach, they have been doing the no recycling thing for 25 years and so they have it engrained that they do not need to. But I find it weird that the older folks think it's so important but the middle age folks don't care so much (RO5)

This theme was reoccurring and could also be related to the types of programs implemented in certain areas as well as what sort of groups of people may be best apt at getting recycling programs implemented or buy-in from communities.

Related to this is the process of encouraging and garnering participation and support from residents. Several of the communities studied are focusing on educating school-aged children to encourage household recycling. Information and presentations are being given to these children whom are bringing the information home. This

48

approach is having a positive impact on recycling. Both a larger city and a county noted

that they are hearing about the impact from parents, that the children are a driving force

in recycling and waste management decisions.

Recycling Advocates

The occurrence of recycling advocates or those that strongly push the recycling

agenda was noticeably absent from the majority of communities studied. While

community officials did note that at times citizens requested additional or different

recycling services, this was not a common occurrence and there was no outspoken

recycling advocacy groups.

> Personally, from my viewpoint I don't think there are any strong outspoken groups in this
> city. There are obviously some concerned residents that are more vocal than others, you
> know the in thing now is to be green so there is a lot of support from the community to do
> these sort of things (RO5)

These findings were consistent in both larger and smaller communities and in

counties that are more rural, these findings were also constant across state lines. The

more rural county expressed that they believe more people want recycling, but that

people understand there are limitations due to financial constraints related to the

economy. However, many communities mentioned student and civic groups that provided

education on recycling.

Economic/Financial Factors

Economic and financial factors of various types influence community-wide

recycling program decisions (Figure 11). These factors include decisions based on

availability of funds within a community, policies related to waste generation and

49

encouraging recycling based on community fees, the economics of recycling markets, and decreasing the cost and increasing efficiency within communities.

Figure 11. Economic/Financial Factors.

Availability of Community Funds

The availability of funds to implement and run recycling programs within a community is a strong determinant of the successful implementation recycling programs within communities. This was true within several communities studied. There is a direct positive correlation between available community funds and successful recycling program implementation. Furthermore, communities have different recycling program funding

structures for various reasons. In Minnesota, many communities rely on grants that are passed down from the state to counties, which are then passed down to towns and cities. Still other Minnesota communities and North Dakota communities procure funds for recycling through various other means.

Minnesota's SCORE program provides funding directly and indirectly to some communities for recycling purposes. This funding can be used for anything from recycling and waste management education to day-to-day operation costs within a community. Program expenditures are outlined in Figure 12 below. Communities in both Minnesota and North Dakota also use various other means to fund recycling programs, these means range from user fees to taxes to cost sharing to grants. Typically, all fees and money raised for recycling and through the selling of recyclables is used to cover the cost of running recycling programs. One of the smaller communities identified a grant as one the primary reasons a curbside recycling program was started in their community; essentially the grant allowed them to purchase the recycling trucks that were needed.

Waste Generation and Recycling Community Fees

Related to the availability of community funds to implement and operate recycling programs are waste generation and recycling community fees. Such fees are implemented not only to offset waste production and to encourage recycling, but also to help fund recycling programs as mentioned above. These fees vary by community, but are common in one form or another in most communities studied.
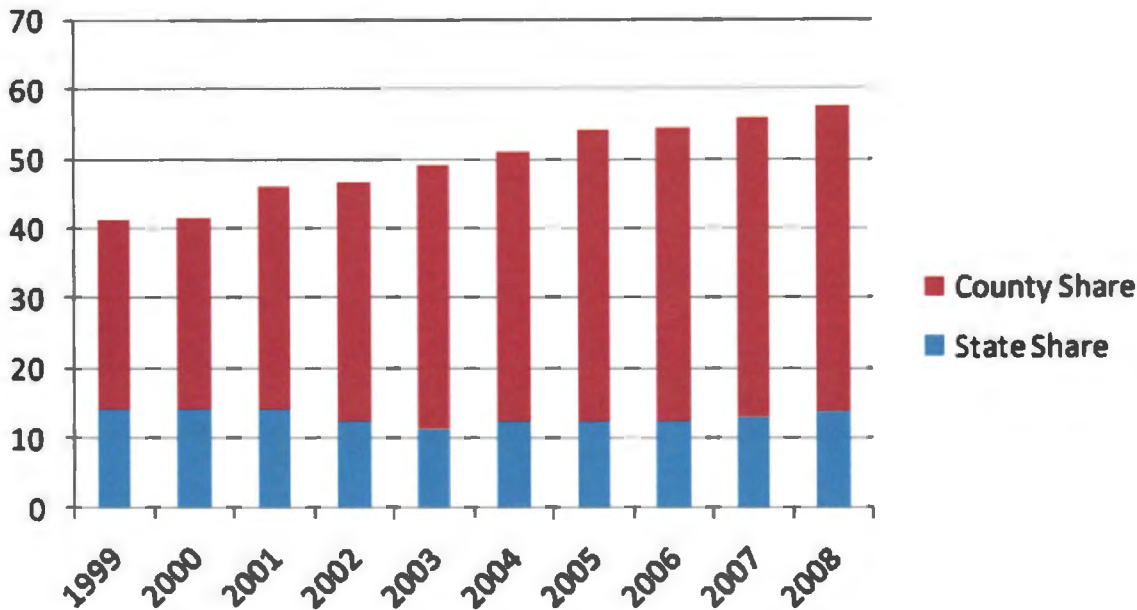
Figure 12. Minnesota SCORE Program Expenditures in Millions of Dollars.
Source: MPCA, 2010.

Within one of the communities studied, the community switched from free waste
pickup with fee-based curbside recycling to pay-per-use volume based waste collection
and free recycling. This change reflected an approach to encourage recycling while
discouraging non-recyclable waste generation. A fee was applied to the waste collection
not only to encourage recycling but also to help cover the costs of recycling and waste
management. This change resulted in a drastic increase in curbside recycling availability,
from 1,500 households to 25,000 households. While a drastic increase in curbside
recycling availability was found, the results of this change are yet to be seen due to the
recentness of these changes. Emphasis is also placed on making recycling programs more
efficient in an attempt to reduce costs for residents.

The Economics of Recycling Markets

An important point to note is that while a community may have the resources to collect all common recyclables and some less common recyclables, the recycling market has a huge impact on the practicality of various types of recycling programs. Essentially, in many areas, the market determines which types of recycling are practical and which are not. As one community official points out in regards to the acceptability of different types of recyclables by the processor: "because it basically comes down to whether they can sell it, whether or not they take it; or the volumes are just not there" (RO4).

When asked about what sort of recyclables are collected and how that decision was made another community official replied, "well part of it it's by statute that you have to and the other part of it is market driven. If it's a commodity that they (the processor) can collect and market at a profit they are more apt to do that." The recycling markets clearly do drive the economics of recycling and impact community recycling programs; the market must exist for the recyclable to be collected and processed.

Administrative Factors

Administrative factors were a large driving force of attributes that affected community-wide recycling program decisions (Figure 13). These factors included recycling related ordinances and policies, the political process, decisions based on land filling and recycling capabilities, market availability, state and federal mandates and recommendations, technology-based capabilities and limitations, and environmental factors.

53
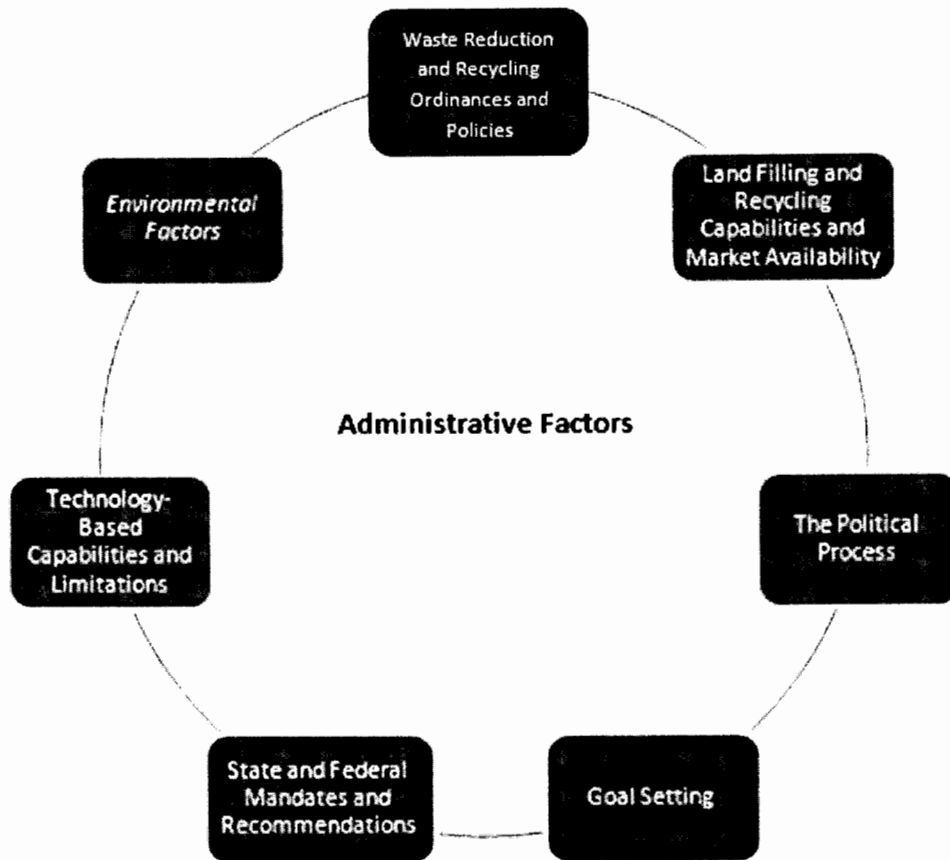
Figure 13. Administrative Factors.

Waste Reduction and Recycling Ordinances and Policies

A growing trend within communities is the establishment of ordinances and

policies that promote waste reduction while encouraging recycling; this was noted within

several communities that were studied. These ordinances and policies relate not only to

internal policies within city and county governmental organizations, but also to policies

that apply to residents and those that make use of community resources. Additionally,

some communities are implementing policies that affect future development, while others are making changes that affect the status quo in various areas of a community.

An effort to reclaim landfill space while implementing new waste management and recycling practices is being made in one of the larger communities studied. Policy and ordinance changes resulted in the implementation of pay-per-use volume based waste collection service and a no-user-cost source separated curbside recycling program at all single-family households within the community; a change from non-volume based waste collection and fee based curbside recycling. This change resulted in a drastic increase of recycling opportunities for community residents, an increase from approximately 1,500 households to 25,000 households having the recycling service available to them at their curbside.

Ordinances have also been implemented related to private waste haulers. One of the smaller cities studied requires all private haulers that service the city to offer curbside recycling to those residents they collect from; additionally, said recyclables have to be taken to a licensed recycling facility. The city requires the service to be offered, but it does not require residents to use the service. The debate is ongoing related to future development within communities that would affect recycling and waste management. Within one of the larger cities, various people within the city government are discussing an ordinance that would require new apartment complexes to offer space for recyclable collection. However, discussion is ongoing and no decisions have been made regarding such a policy.

Ordinances and policies can have a direct impact on waste management and recycling in a community. This can range from causing a dramatic increase in recycling availability to being the sole reason a community has recycling to allowing for better growth of recycling availability within a community. Ordinances and policies can clearly have an impact on recycling participation within a community. However, this approach can be a highly political one.

The Political Process

As with ordinances and policies, politics is an important area to consider within the realm of recycling. Politics can and does have an impact on recycling implementation and support. Politics can play into whether a recycling program is implemented at all, it can affect the future of recycling programs, and it can influence funding streams.

The political process is central to almost all recycling programs, both in their implementation and their day-to-day operations. The political process not only relates to and affects how programs are implemented and what types of programs are implemented, but they also play into how the programs evolve or if they die off or change significantly. A progressive government can lead to the implementation of more and better recycling programs while other governments can lead to the decline in recycling opportunities for whatever reason, be it the allocation of funds for other projects or simply not having a leadership that is interested in recycling. Within one of the smaller counties, the county officials mentioned that they were conducting a study to look into

56

their entire recycling program, and possibly changing it. They emphasized it was a political process that takes time.

When determining long-term goals and where a waste management and recycling program may go is typically a political process. Within one of the smaller cities it was mentioned that the decisions are basically up to the commissioners, they decide where the programs will go and how they will evolve. It is then up to the public works director to carry out their plans. This type of structure results in decisions being based more on political factors rather than being based on other factors such as the practicality of recycling within a community. This structure takes the decision away from those most familiar with waste management and recycling decisions.

The political process often relates to funding availability within the community not only for the implementation of programs but also for the day-to-day operations. For example, within one of the smaller cities the sanitation manager remarked that they would love to increase the recycling opportunities within the city; however, it all comes down to the availability of funding. He stated that while recycling is important within the community, there are other things of higher priority such as funding the police and fire departments. One of the other counties studied also expressed these sentiments. It was emphasized that the decisions were a political process and a cost-benefit analysis. They noted that these types of programs were expensive to operate and elected officials in particular were reluctant to impose additional costs on their constituents. Officials within this county also noted that they believe this is a common theme wherever you go.

Land Filling and Recycling Capabilities and Market Availability

A theme that became apparent quite often during my research was the impact that land filling and recycling capabilities had on decisions related to recycling as well as the potential markets for recyclable materials. A single processor served the majority of the communities that were a part of this study. This single processor essentially controlled the recycling market in the area, by determining what recyclables it would accept from the communities and what it would not accept. This essentially determined to what extent the communities could recycle. If the processor did not want to accept a certain type of recyclable, but a community did, essentially the community was out of luck unless their found a way to move their recyclable material to another market. This sentiment was expressed in one of the larger cities, "we are told what we can accept."

The larger recycling markets, which the community processor must sell to, also influence community-wide recycling decisions. If there are a lack of markets for certain types of recyclables then the processor is not inclined to attempt to recycle these types of materials, for financial reasons. "Part of its market driven, if it's a commodity they can collect and market at a profit they are more apt to do that," explained a county official. The county official continued, explaining that it was part of their program to encourage the development of recycling markets. This process allowed other organizations to become involved with the end result of hopefully removing another item from the waste stream.

58

The technologies available within a community and the processor also directly influence the type of recycling program implemented and the possible successful implementation. Processors with the more advanced technologies that can handle things such as single stream are able to offer a more simplified recycling process to their customers and communities they serve. The simplification of the recycling process can have an impact on recycling program participation.

Local, State, and Federal Mandates and Recommendations

Local, state and federal mandates and recommendations have one of the largest impacts on recycling within the communities studied. These mandates and recommendations varied vastly by state and community, nevertheless they had a substantial impact on the majority of communities studied. The State of Minnesota has specific recycling mandate levels while the State of North Dakota relied more heavily on recommendations at the state level and for more specific policies and recommendations at the community level.

Minnesota has specific requirements and programs related to recycling and waste management. These requirements relate back to the Minnesota Waste Management Act of 1980, which sought to manage and reduce municipal solid waste. In addition to the Minnesota Waste Management Act, Minnesota established the Governor's Select Committee on Recycling and the Environment (SCORE Program). This program made funds available for waste management, much of which directly relates to recycling program implementation and the coverage of day-to-day recycling operations, as well as

59

waste reduction. Additionally, the state urged communities to set goals and try to surpass them. Furthermore, within Minnesota the statute identifies certain types of materials that must be recycled.

North Dakota relies on voluntary waste reduction within communities. The state had set a goal of 40% waste reduction by the year 2000. Additionally, in contrast to Minnesota, North Dakota does not provide monetary support to communities for recycling programs directly. Communities are encouraged to recycle; however, much of the program research, implementation, and operation are funded at the local level. Recycling programs are typically supported by the cities not counties; this is in stark contrast with Minnesota who makes funds available to the county, after which the county may provide funds to towns and cities. In North Dakota, the majority of recycling programs are funded locally; however, North Dakota does offer a state program, Project Safe Send, which aims at recycling agricultural products.

On the local level, communities have various mandates and recommendations. These relate both to formal ordinances, as was mentioned previously, as well as simple recommendations. Within Minnesota, many of these mandates and recommendations are passed down from the state to the counties, the counties then pass them down to the communities within the counties. With mandates, these communities are required to a minimum meet the requirements set at the county level, typically by the county. One of the smaller communities studied mandates that recycling be offered but does not require residents to recycle, while another community recommends that the residents recycle by

making recycling free and charging for waste disposal. Various structures exist, some of which are a result of mandates that are passed down from above, via the state or county. Other structures rely on participation based on user cost savings, while other communities simply offer the services.

Technology-Based Capabilities and Limitations

The technology capabilities and limitations behind recycling is an important factor related to the implementation and operation of recycling programs; especially as the technology relates to the hauling and processing of recyclables. The technology at the processing facility is an important determination in the type of recycling program that can be implemented within a community, be it source separated, dual, or single stream. The capability to process recyclables via one of these collection methods will directly relate to costs; not only startup costs for a recycling program, but also ongoing costs related to the type of program implemented and related collection mediums, be it dumpster or bins, as well as people power and transportation costs, among others.

Environmental Factors

Environmental factors also play a role in recycling program decisions. One growing area of recycling is that of yard waste and other organic materials. One community estimates that 40-50% of the waste stream is organic materials, this falls in line with another community that recently completed a waste study that showed 48% of its waste was organic.

Because organic materials are such a large portion of the waste stream it is important to consider these items as a part of community recycling programs. While this type of recycling is important, within the communities that were studied, the environment poses an issue. With several months of the year having temperatures at or below freezing the process of composting and recycling of organic materials outdoors is limited. While options do exist for doing these processes indoors, they are typically cost-prohibitive.

There are eleven themes covering a vast set of attributes in relation to social, economic/financial, and administrative factors that influence community-wide recycling program decisions. It is important to keep these themes in mind as recycling programs are developed and during their implementation as they can have a profound effect on recycling programs. The next chapter will present partnerships, costs, and community structures and how they relate to recycling programs.

CHAPTER 7. PARTNERSHIPS, COSTS, AND COMMUNITY STRUCTURES

This chapter discusses how factors such as partnerships, costs, and community structures influence community-wide recycling programs. The discussion on partnerships includes public-public, public-private, and private-private partnerships and related dynamics. The costs section discusses themes ranging from implementation costs to day-to-day costs to the costs of recycling and land filling to the correlation of costs and community type. Finally, a section on community structure will take into account population stratification and distribution and community specific factors.

Partnerships

Various types of partnerships were present within many of the communities studied (Figure 14). These partnerships included public-public, public-private, and private-private partnerships and agreements. This study found that partnerships of various types are important to successful community-wide recycling programs.

Public-Public Partnerships

Public-public partnerships were present in many of the communities studied. These partnerships were present at all levels of government to varying degrees. They ranged greatly from counties sharing information with cities and towns within their county to two cities sharing waste management facilities to state resources trickling down to the city and town level.

Public-public partnerships were very common in Minnesota between the state and counties and counties and the cities and towns within them. This is the result of state

mandates and a funding structure that is a top-down approach from the state to the

county, the county is responsible for the cities and towns within it. These partnerships

are primarily based around the sharing of mandates and funds, between all public entities

within the state.

Private   Private

Partnerships

Public   Public
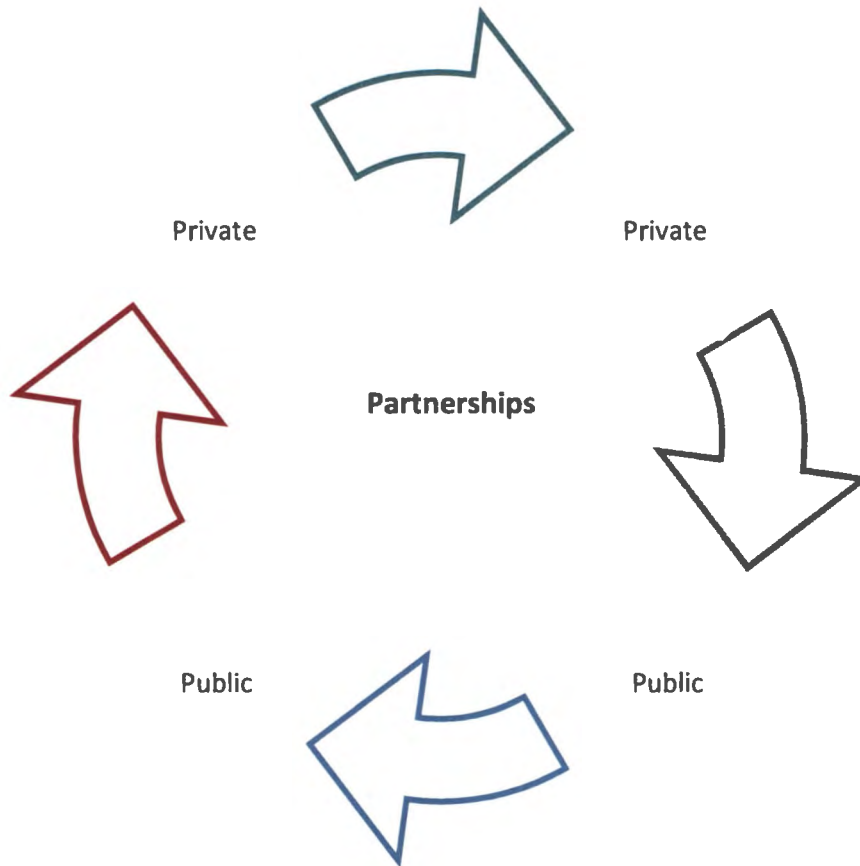
Figure 14. Partnership Diagram.

The counties that were studied in Minnesota work very closely and directly with

the cities and towns within their political boundaries. The county-city/town interaction is

both related to mandates and funding. Because recycling and waste management

mandates in Minnesota are top-down, cities and towns must follow, at a minimum, the

mandates that the state places on the county. Because of this, there are typically several

public-public partnerships.

Within one of the Minnesota counties studied there were several public-public

partnerships. These partnerships included the sharing of a waste transfer station, the

sharing of recycling facilities across the county, the sharing of educational and

promotional material, as well as the sharing of funds. The waste management and

recycling programs within their county were primarily run by the county. Waste

management and recycling regulations were the initial responsibility of the county. The

county was required to ensure that it met the state requirements and that the cities and

towns within its political boundaries met the requirements. The county was also

responsible for the allocation of funds and resources. Funds for operations, materials,

promotional resources, and other expenses were in part provided by the state to the

county. The county was responsible for passing the funds down or making the resources

available to the cities in towns within their boundaries. The county ran most of the

recycling collection facilities within the county and towns, operated the solid waste

transfer station, produced much of the recycling promotional material, and were the

primary educator on recycling related issues within the county's cities and towns. There

was a direct public-public partnership between the county and various cities and towns

within its political boundaries.

Another type of public-public partnerships was between communities of different

sizes. These partnerships often focused on the sharing of resources. Such sharing

allowed the smaller communities to offer services that they would not be able to offer on their own, whereas allowing the larger communities an additional source of income. One such example was a larger city that allowed smaller towns access to all of its waste management and recycling facilities, including hazardous wastes because the smaller towns used the larger community's landfill.

> The way it works currently, if a community brings their solid waste to our landfill, they are allowed to use all of our facilities within the city solid waste. So they can bring their hazardous waste to be recycled correctly and they can use any of our (recycling) drop-off sites. They can bring their stuff as long as they are customers of the landfill. We do quite a few communities within the county (RO5).

This partnership allows smaller towns to offer services to its citizens that it would not have been able to offer on its own, such as the hazardous waste recycling. These partnerships also provide the larger community an additional source of income through its landfill tipping fees.

Public-Private Partnerships

Public-private partnerships were very common within the communities studied. These partnerships were primarily between the cities and towns and the private recycling processor that serviced most of the communities within the area, across both states. Additional public private partnerships existed between communities and local businesses both as the community as a recycling hauler/processor and businesses as a hauler/processor.

The city/town and private recycling processor partnership was the most pronounced public-private partnership within the communities studied. The majority of

the communities studied used a single private business as their recycling processor. The

partnership was directly between either a city or town, or a county, depending on which

state the municipality was in and the private business. These communities had direct

agreements with the private business to process the majority of recyclables within the

communities.

This public-private partnership had advantages and disadvantages. The

advantages of this partnership include allowing the communities to offset their waste

management costs, reduce the number of community employees needed for waste

management and recycling, and ease some of their waste management responsibilities.

This setup afforded the communities financial relief from the costs of running a recyclable

processing facility.

The disadvantages of this partnership relate to the decrease in control over the

local recycling market and the loss of some recycling revenues. To an extent, the

communities serviced by the private processor were able to only recycle what the private

processor wanted to recycle. If the community wanted to expand to other areas, but the

recyclable processor did not want to, the community was out of luck, unless the

community wanted to process and market the recyclables on their own. Additionally, the

communities are not able to achieve the full benefit of the sale of the recyclables as their

processor was the primary beneficiary of funds collected through the sale of recyclables.

Other public-private partnerships existed between communities and local

companies that reuse the recyclable material, as well as recyclable hauling partnerships

between communities and private businesses. One of the medium sized communities developed agreements and partnerships with various businesses around the area that would take the community's recyclables and turn them into consumer products. This setup allows for the benefit of recycling to remain local and allows the community to help out local area businesses.

Several communities within the area also offer recyclable hauling services to private companies. These public-private partnerships vary by community but they allow communities to offer more recycling capabilities within their community, thereby further reducing the amount of material that is land filled. These are often private-public-private partnerships as the community is at times just the hauler between one business and the processor; however, often the processor will work directly with the business.

Private-Private Partnerships

Private-private partnerships within the area are typically between the private recycling processor and area businesses. The private recycling processor has many contracts with local businesses to be their recyclable hauler and processor. These partnerships benefit both the processor by providing them with more business and revenue opportunities and it benefits the private businesses in that it reduces the amount of waste the business has to pay to landfill.

Costs

Discussion of costs related to recycling and waste management was a reoccurring theme within many of the communities studied. Such discussion ranged from

implementation costs to day-to-day costs to the costs of recycling and land filling to the

correlation of costs and community type (Figure 15). Within this section these themes

and how they influence community-wide recycling programs are discussed.

Though these costs and funding structures vary by community, every recycling

program will have costs related to both implementation and day-to-day operations. Both

the implementation costs and day-to-day operation costs are important points to consider

related to recycling programs. These costs and the money available to fund them helps

the communities determine if they will implement a program, what type of program they

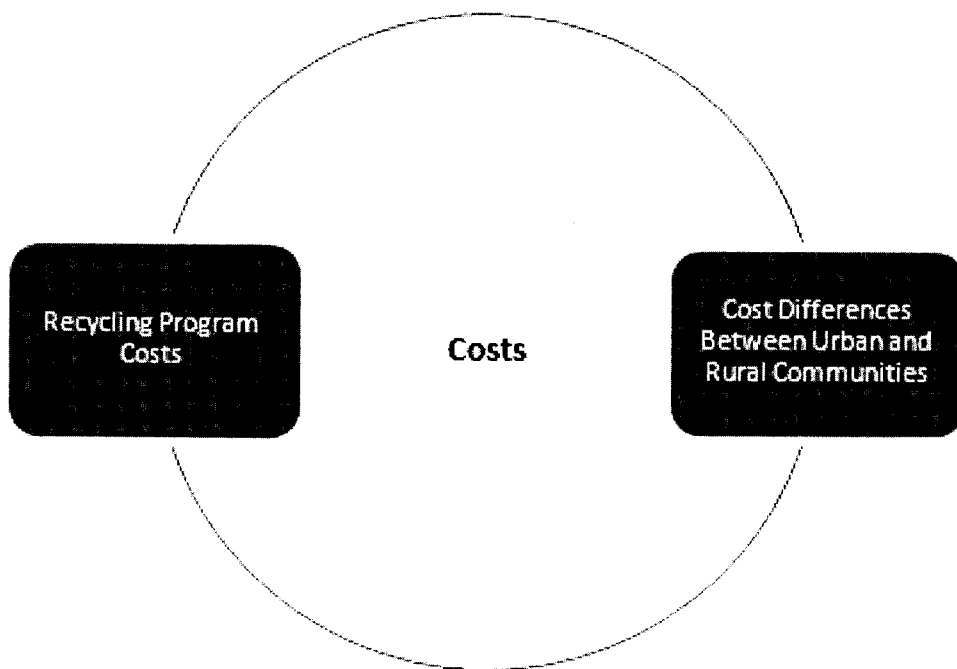implement, or how many recycling and waste management services they are able to offer.

Figure 15. Costs.

Recycling Program Costs

The recycling program implementation costs are likely to be a factor in every community. There is a cost to someone during program implementation and once the program is operational. This cost will vary but will be present due to the need of infrastructure, transportation, processing capabilities, and educational and promotional materials, among other items. While these costs are present, it is not to say that they will automatically be an overall financial burden on a community because the successful implementation of a recycling program will affect waste collection, processing, storage, and land filling costs. Additionally, there can be some fund recovery opportunities through the selling of the recyclable materials.

Costs can also play a factor into what is recycled and what is not. Of the communities studied, products recycled varied, many times due to financial reasons. All of the communities that recycled offered the recycling of glass and plastics one and two however the recycling of other materials varied by community. This finding was typically due to demand and costs.

The demand for certain types of recyclables as well as the amount the community produces relates directly to the type of recyclables that are collected, as it all relates to costs. Within one of the larger communities, there was interest to expand recycling to boxboard; however, the costs did not support the decision to do this expansion. The costs of recycling boxboard were much too high to cover the additional cost of recycling the material, including storage, transportation, and processing, it was simply not economically

70

feasible. As one community official mentioned, "you would never get approval for it because we would be losing so much money to offer such a small service. So in reality it would be great to recycle everything, but you have to justify it by how much it costs." The same held true for expanding recycling to plastics three to five, it was simply not economically feasible.

Cost Differences between Urban and Rural Communities

Differences in costs and related decisions are seen when comparing urban and rural communities. These differences evolved through my research of communities of various sizes. These differences are attributable to various factors; however, it is important to consider the nature of an urban community vs. that of a rural community in terms of a population distribution and geographic space.

The distribution of the population within an area will impact the costs of both implementing and operating a recycling program within a municipality. Areas that are more rural require more recycling drop off locations per capita or require recyclable material collection vehicles to travel further to collect recyclables. This would result in higher costs when compared to a more dense area served by fewer drop off sites and would require collection vehicles to travel a shorter distance. One of the more rural communities studied portrayed this sentiment: "you have remote areas, there is not a population base, and the costs it takes to administer that program is so great."

This more rural community also made a point to emphasize that their current recyclable collection method was implemented because it was the cheapest method,

further supporting the notion that implementation costs are an important factor. Furthermore, the community officials made several comments about continuing costs associated with running the recycling program and the desire to continually reduce costs by becoming more efficient.

Community Structure

There are two other factors identified as influencing community-wide recycling program decisions. These factors include population stratification and distribution and community specific factors (Figure 16). These findings represent factors that create differences between communities with various structures and should be considered when developing and running a recycling program.
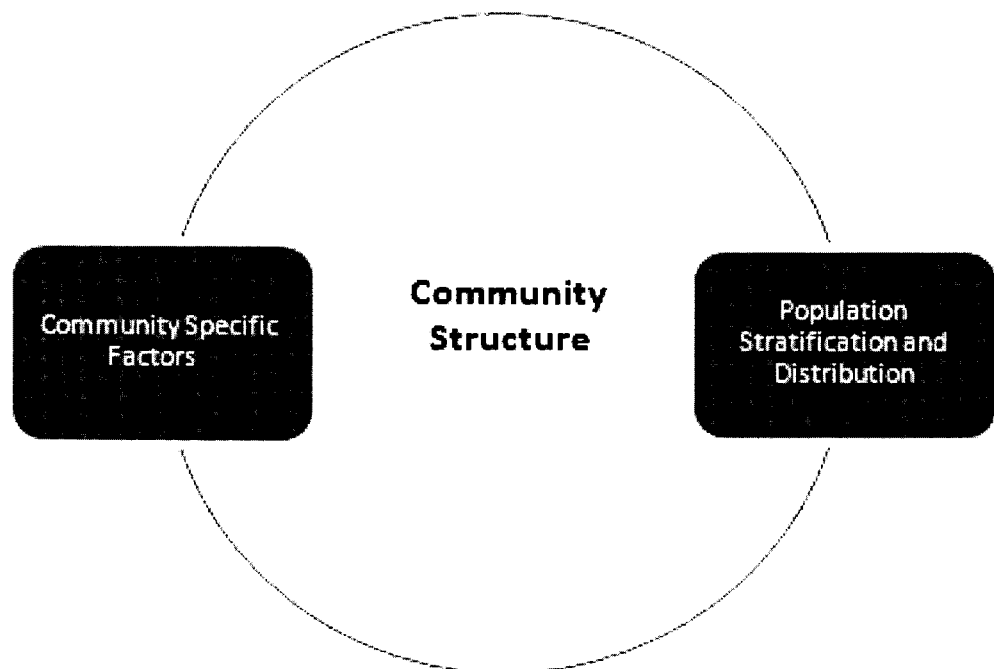

Figure 16. Community Structure.

<u>Population Stratification and Distribution</u>

As was briefly mentioned previously, the differing factors that are present in urban

vs. rural communities influences community recycling decisions. Along with the cost

differences as was mentioned earlier, there are differences in collection means and

locations, as well as ordinances within the communities studied. One of the smaller, more

rural communities emphasized that they decided where to put recyclable collection sites

based on traffic patterns, population base, and volumes of recyclables. Not surprisingly

the more busy and populated areas had more recyclables collection sites and higher

volumes, than the more rural and less populated areas. These results, while not

surprising, do play into implementation strategies, especially when looking at urban vs.

rural areas.

Ordinances and policies related to recycling play into implementation practices.

One of the more rural communities noted:

> With a bigger population base you will see more ordinances and rules and
> regulations trying to get people to do things (in regards to recycling and waste
> management) (RO1).

This statement was found to be true through the study of several urban and rural

communities of various sizes. Generally, the size of the community does correlate with

the number of ordinances, rules, and regulations within a community related to recycling

and waste management. Commonly, the larger communities had more ordinances, rules,

and regulations related to recycling and waste management. However, some of the

73

smaller communities had more ordinances, rules, and regulations than communities larger then themselves.

The three largest cities studied all offer curbside recycling programs, hazardous waste collection, and compost facilities and have ordinances, rules, and regulations related to them. Several of the smaller communities offer limited recycling and do not have local hazardous waste collection or composting facilities; incidentally, they have less local ordinances, rules, and regulations. However, this can vary between North Dakota and Minnesota due to state mandate differences and county level policies.

Community Specific Factors

While generalizations can be made with urban vs. rural, larger vs. smaller, and this community vs. that community, specific factors within a community can have an important impact on the community's decisions related to waste management and recycling. A smaller community can have a more advanced recycling and waste management program because of a strong resident voice. Population demographics play into recycling participation. Location and the physical terrain have an impact on recycling decisions. Ordinances, laws, and policies passed down from a higher government or developed locally have a greater impact on recycling than other previously mentioned factors. While there are some identifiable factors that have certain impacts on recycling programs, one should remember that any number of other community specific factors can change the entire recycling dynamic within a community. These community specific

factors must be taken into consideration when implementing and running community-wide recycling programs.

There are a wide array of factors, situations, and structures that influence recycling program decisions. These attributes can affect how program implementation, how a program is run, and how successful a program is. Consider all of these attributes when implementing or operating a recycling program.

CHAPTER 8. DISCUSSION

The purpose of this study was to determine how the social, economic/financial, and administrative factors within a community influence the implementation of community-wide recycling programs. More specifically, this study explored how factors such as urban or rural nature, population size, and public/private partnerships influence recycling decisions. To meet this purpose the study I sought to identify what steps could be taken to implement a community-wide recycling program and how this process was affected by the aforementioned factors.

The results of this study present similar finding to other research as outlined in the literature review. Specifically, there were positive correlations between costs of recycling programs and willingness to have a program (RO1; RO2; RO6). Similar findings were also found in factors that influence the participation of residents in a recycling program such as the easiness of use (Derksen and Gartrell, 1993); and other social, economic, and administrative factors (Derksen and Gartrell ,1993; Hopper and Nielsen, 1991; De Young, 1990; Oskamp et al., 1991; Howenstine, 1993; Palatnik, et al., 2005). However, little literature was available regarding recycling programs as a community decision rather most literature looked at recycling at the individual level.

This chapter will examine each of the major areas defined in the findings chapters; it will correlate these findings with the literature where warranted. Rational Choice Theory is used, as appropriate, to guide and interpret the findings. This chapter discusses

76

the importance of this study and it presents its limitations, implications, and recommendations. Finally, areas for additional research are presented.

The Application of Social Theory

Rational Choice Theory was used as a guide, reference, and lens for this research project. Rational Choice Theory was used as a guide to look at why individuals may or may not recycle. This analysis was more specific when reviewing the literature. This theory is applicable to the research conducted with the community officials. This study sought to understand recycling as a decision that individuals make and as a lens for understand recycling as a decision by a larger group, the community. Understanding the community, and its decisions, was essential in building an effective recycling program. Rational Choice Theory can also be used to understand why people may or may not recycle. Green (2002) suggested that the themes maximizing utility, awareness of constraints, environment, consistency, and equilibrium relate to Rational Choice Theory. Understanding these themes and applying them to recycling decisions on both the individual and community level allowed for a better understanding of decisions made in regards to recycling. Rational choice theory as a guide to data collection interpretation is outlined in Table 2 below.

Table 2. Rational Choice Theory as a Guide to Data Collection and Interpretation.

Rational Choice Theory Concepts	Individual Level	Community Level
Costs Minimization	Recyclers having to pay less for garbage collection costs	Recycling reduces the costs of operating landfills and siting new landfills
Reward Maximization	Payment for recycling various types of materials	Promoting recycling can lead to a reduce in landfilling costs while providing additional job opportunities to the community
Implicit Incentive Structure	Looking for who will pay the most for various types of recyclables	Looking for who will pay the most for various types of recyclables
Restraints	The limits of the recycling markets	The limits of the recycling markets

Factors Influencing the Implementation of Successful Recycling Programs

This study sought to identify factors that resulted in the implementation of a successful recycling program to help determine how various factors influence recycling decisions at the community level. The premise was that if people know why a recycling program was successful they would be able to reverse-engineer it and develop a list of factors, themes, and ideas that could be used to implement new recycling programs that would be successful as well as improve current recycling programs that are struggling. This method proved to be more difficult than originally anticipated due to the lack of records within various communities outlining the processes as well as numerous other themes, ideas, and factors that developed though out the research. Nevertheless, various factors, themes, and ideas were developed that helped identify the process.

Understanding and studying these factors is imperative, as the understanding of them is essential when starting a program.

What Constitutes a "Successful" Recycling Program?

The goal of this section was to determine what constitutes a "successful" recycling program. First, it attempted to define "successful" recycling program. This broad definition or factors that could be used to define it were based on what recycling officials considered a success. The factors that were used to define success varied by community; however, (1)community ownership, (2) public participation, (3) societal influences, and (4) education were the most common themes throughout. Because recycling officials used these themes in their definition of successful, it is safe to use these not only as a means of identifying a successful program but in using these themes as goals to strive towards when attempting to establish a successful community-wide recycling program. The recycling officials developed this definition and themes through their experiences with recycling programs.

Products Recycled

The products that are commonly recycled were documented to provide an idea of what materials are commonly marketable, especially in areas that are smaller and more rural. It is important to understand what these products are because a community can only recycle products that can be marketed. The goal is to ensure that those looking to establish a program understand the feasibility of recycling particular products. This feasibility may change over time as recycling programs develop.

The Development of Recycling Markets

Related directly to understanding the products that can be recycled is the understanding and development of recycling markets. One of the first steps in establishing a successful program is ensuring that a market is available to recycle the materials that are collected. It does no good to collect materials and simply warehouse them because recycling markets were not developed prior to or during the implementation of the program.

Strategies to Encourage Community-Wide Recycling

It is of utmost importance to be able to identify means of encouraging recycling within a community. All of the infrastructure will be of no use if the residents of a community will not recycle. Financial incentives, availability and convenience, and educational and informational campaigns are a key part to encouraging recycling participation.

Encouraging recycling through financial incentives was a common and successful practice in several communities; this was consistent with the findings of Palatnik, Ayalon, and Shechter (2005). Palatnik, et al. (2005) also correlated these findings with ease of recycling. This also relates to my findings within communities related to availability and the convenience of recycling. If it is relatively easy to recycle, people are more likely to recycle.

Educational and informational campaigns are essential for the success of a recycling program. The residents of the community must know how to recycle, what can

80

be recycled, and the benefits of recycling. While this information is important, more than simple information is needed to influence attitudes related to recycling, this is consistent with the findings of Hopper and Nielsen (1991). The following attributes should also be taken into consideration because they influence decisions related to recycling.

Social, Economic/Financial, and Administrative Factors

This study found that social, economic/financial, and administrative factors play a large role in influencing the implementation of a community-wide recycling program. Some of the current literature supports the conclusions found in this study; however, some of the findings in the literature were not consistent with this study. These findings suggest either that some of the findings in the literature review are not applicable to the area that was studied or that other factors, in the area studied, had a larger impact, essentially changing some of the outcomes.

Social factor correlations between the literature and this study's findings varied. Whereas age was mentioned as a factor that influenced participation, this was the only socio-demographic factor that was found to correlate to participation in recycling; this is consistent with some literature.   There were some other positive correlations between this study's findings related to social factors and the literatures findings related to personal characteristics. Derksen and Gartrell (1993) suggested that people that have access to a structured recycling program are more like to recycle than those without a structured program. This correlates with previous findings that access to information related to recycling, representative of a structured program, enhances participation in

recycling programs. In fact, access to this information is essential in developing a successful recycling program.

Though not identical to the findings of Hopper and Nielsen (1991) related to prompt styles, similarities were found between this study and those found by Hopper and Nielsen. Prompting relating to recycling is an important method to aid in enhancing recycling participation. Whereas based on my findings, nearly any type of prompting, including prompting through modeling (imitation) would be beneficial. I agree with Hopper and Nielsen that more specific prompting through the use of block leaders, awareness of consequences, and regular prompting would be more effective.

Oskamp, Harrington, Edwards, Sherwood, Okuda, and Swanson (1991) suggested that having friends and neighbors who recycle will influence recycling behavior due to modeling stimulus. My study came to similar conclusions. However, having friends and neighbors who do recycle does not mean that someone else will definitely start recycling, or model that behavior.   Social exchange theory from the Levi-Strauss perspective would suggest that societal rules and norms would have an impact on behavior. Additionally rational choice theory, which suggests that the individual's decisions will be characteristic of that of a larger group, would also support the findings in this study.

These factors would be supportive of both my findings and the Hopper and Nielsen (1991) findings in relation to attempting to influence behavior though the use of prompting, block leaders, and modeling and how others could see these as societal norms. Although all of this may be true, it should be kept in mind that Shalom H.

Schwartz (1968a, 1968b, 1970, 1973, 1977) found that, though individuals acknowledge norms, they will not necessarily follow them. This belief was consistent with a sentiment shared by a recycling official.

A positive correlation between ease of recycling and participation rates was found in various communities interviewed. The harder it is to recycle, the less likely someone is to recycle; those findings are consistent with Palatnik, Ayalon, and Shechter (2005). Finally, Howenstine (1993) suggested that a set of conditions determine if a person will recycle or not. These conditions include sufficient motivation, knowledge, and the ability to overcome inconveniences associated with recycling. Knowledge and the ability to overcome inconveniences associated with knowledge were also factors mentioned by recycling officials.

Economic and financial factors played an important role in recycling program implementation and participation. In correlation with the findings of Highfill and McAsey (2000) the availability of community funds had an impact on the implementation of recycling programs. Within the communities studied those within Minnesota, as a whole, had more prevalent recycling programs than those in North Dakota. This is attributed to the difference in funding structures for the programs. Whereas in Minnesota funds are available from the state level down to the community level, in North Dakota funds are not regularly funneled down. Furthermore, most community officials noted that they wanted to improve and expand their recycling program; however, funds were not available to expand the programs to the level they desired.

Improved recycling and the use of fees to discourage waste generation was a new program implemented in one of the communities studied. The community switched from free waste pickup with fee-based curbside recycling to pay-per-use volume based waste collection and free recycling. This change resulted in a drastic increase in recycling availability to community members, an increase from 1,500 households to 25,000 households. The idea behind this was to discourage waste production and encourage recycling. This method coupled with an easy to recycle program was also found to be successful by Palatnik, et al. (2005). The application of the Rational Choice Theory concept of maximizing utility (Green, 2002) to the situation suggests that people will generally go along with the aforementioned changes because it is the favored alternative.

Administrative factors that came into play in the communities studied included waste reduction and recycling ordinances and policies, the political process, land filling and recycling capabilities and market availability, and local, state, and federal mandates and recommendations. Waste reduction and recycling ordinances and policies that promote recycling over waste generation are a growing trend across the communities studied. However, the specifics of the ordinances and policies varied. In one of the communities studied, specific changes were put in place that made recycling free and instituted a charge for solid waste by volume. This change provided monetary benefits for those that recycled through savings on solid waste disposal costs. This suggests that people may be more inclined to recycle though a combination of their financial and other motives. Additionally, various ordinances exist in Minnesota that not only provide

funding for the implementation and operation of recycling programs, but also provides mandates that require the offering of recycling opportunities.

The political process plays an important role in regards to recycling decisions. At a broader level, the political process has a considerable impact on recycling in Minnesota, as was previously described. In addition, the political process plays a role in how programs are developed and how they evolve. Through my research it was found that many recycling decisions are made by those in political office, albeit at times with guidance from the recycling experts. This political process also relates to decisions based on funding availability and more simply the personal and political characteristics of those in the political office making the decisions.

Landfilling and recycling capabilities and market availability play an extremely important role in recycling decisions. The recycling capabilities and their relation to market availability were among the largest factors that influenced recycling decisions within the communities studied. Mainly the recyclable processor determined what could be recycled and at what cost. This was due to the few other options available in the area. Because the processor is a for-profit company Social Exchange Theory from the Blau (1964, 1994) economic perspective can be applied. This theory suggests that through a cost/benefit analysis the processor decided to only offer recycling services for certain products because of the financial goals of the company.

Local, state, and federal mandates and recommendations played varying roles within the communities studied. The State of Minnesota statutes strongly dictate the

requirement of recycling within counties across the state. However, the state of

Minnesota does not specify certain methods the community must use, this allows for

more freedom among the varying communities across the state. Interestingly, different

communities across the state have varying levels of success (see Appendix D); these

differences can be attributed to various the various social, economic/financial, and

administrative factors, as well as partnerships, costs, community structures, and other

factors outlined in the findings chapters. On the North Dakota side, the lack of state

mandate leaves the majority of the decisions to the communities. As such, varying levels

of success and program types are present.

Partnerships, Costs, and Community Structures

Partnerships, costs, and community structures influence community-wide

recycling programs. The literature did not provide an in-depth look at partnerships, costs,

and community structures.

Partnerships had many impacts on recycling decisions and programs within the

communities studied. Several types of partnerships including public-public, public-

private, and private-private were identified. These partnerships are imperative to the

success of all of the recycling programs. Without partnerships, the current situation

would not allow the communities to recycle. Public-public partnerships allowed for

resource sharing between various communities and allowed smaller communities to

recycle products they would not normally be able to recycle, due to the relatively high

cost for a smaller community. Public-private partnerships allowed for various recycling

processes including the collection, hauling, and processing of the recyclable materials across various communities. Private-private partnerships allowed for recycling services to be offered to private businesses.

Costs were a reoccurring theme within the communities studied. The literature noted that program costs could have an impact on the type of recycling program implemented. Within this study, costs did in fact influence the type of recycling program implemented. Some of the more rural communities implemented a drop-off shed type of program because it was most cost effective for them. In another community, there were calls for increasing the types of items collected for recycling; however, the community simply did not have the funds. The cost of recycling was also a factor with one of the recycling processors. This processor only collected certain types of recyclable material because it was cost effective to recycle those materials. What would happen if the collection and processing were both conducted by the same entity? A municipality for example, that would also be responsible for costs associated with the management of wastes and a landfill. This example is applicable to the Morris (2005) research into life cycle assessment, of a product. Morris found that recycling newspaper, mixed paper, bottles, cans, and other recoverable materials found in household and business municipal solid waste consume less energy than disposal in a landfill or by incineration. Additionally, recycling had less of an environmental impact than does the disposal of these materials in a landfill or by incineration. These factors could be a determinate in cost savings that could influence recycling decisions in a community.

Community structures related to population stratification and distribution as well as community specific factors had an influence on recycling decisions. Population stratification and distribution played a role in decisions within various communities. In the rural communities, the population stratification and distribution plays a role in the type of recycling program implemented as well as the recycling materials that are collected. Due to the very nature of a rural community, it makes sense that a different model for collecting recyclables vs. collecting recyclables in an urban community is present. It makes economic sense.

Limitations

Several limitations are present in this study. First, the communities interviewed in this study are in geographical proximity. This has an impact on the results of this study, namely the lack of a diverse set of recycling processors. One processor served the majority of the communities studied. Throughout the majority of the interviews, the recycling processor had one of the largest impacts on what the community could do with the recycling programs. Although the majority of communities went through the one processor, one community processed their recyclables though local businesses that made products from the recyclables. Additionally, one other community, that was geographically further away than most of the communities, had its recyclables processed by a large national processor.

Furthermore, all communities that were a part of this study had a population of less than 110,000. This smaller population base in these communities has an impact on

88

what types of recycling programs are available to them, specifically due to market size.

This is a limitation in that it may not be generalizable to much larger communities across

the United States.

Finally, limitations were present in that in many of the communities studied, there

was a lack of hard data to support claims made by community officials. Extensive

numbers and hard facts were simply not available. Many of the conclusions were based

on the experiences of the recycling officials, albeit they were the experts on the topic.

This factor could lead to different conclusions, dependant on the experience and opinion

of the community-recycling official. Despite these limitations and shortcomings, this

study provides an insight to the various processes that occur in communities concerning

recycling programs. Additionally, this study provides a framework that aids in recycling

decision-making processes.

Implications and Recommendations

The findings in this study show how specific recycling related policies can influence

not only the implementation of recycling programs within a community, but also the

participation in recycling by individuals within the community. Specific policies at the

state and local levels had an impact on recycling decisions in many communities. Some of

the communities in the study, implemented programs because they were required to and

because funding was available. In other communities, this was not available; as such,

programs did not exist because there was no push or funding available. Policies related to

recycling do have an impact on the implementation of recycling programs.

89

Through my analyzing of current literature and my findings in this study, I have developed several recommendations for both implementing recycling programs as well as suggestions for enhancing programs. While these recommendations are not all-inclusive, they should provide a framework that can be used when developing recycling programs. Additionally, while these recommendations are loosely based around chronological steps, one must remember that you can move around to different steps as appropriate.

Implementing Recycling Programs

1. When looking at implementing a new recycling program, do the research before you begin. Determine and develop the process you would like to take. Identify what recycling processors are in the area. Find out if nearby communities are recycling; contact these communities and other stakeholders to get more information about how their programs work. Use their programs as models; determine what worked and what did not work for them. Ask the communities how they got started, what products they recycle, how products are collected and moved to the processor, who the processor is, and what additional factors and considerations they think you should know. After you have spoken to local communities that have programs, search for other communities that have programs, seek additional recommendations from them. Research into funding structures, what funds will be used to implement the program, what funds will be used for continuation of the program. Determine if grants or other external funding opportunities are available. Doing the appropriate research is this stage is

90

key, it will help you develop a better program and can save you time and money in the end.

2. Involve the community. Community involvement and ownership is essential, residents must feel like the recycling program is theirs, as such take their recommendations seriously. Find residents that would like to get involved in the process and involve them in every step of the process. Hold town-hall meetings to gather additional community input and allow the town-hall meetings to be a means of getting the word out about the program. Be upfront with residents about potential costs, structures, and other factors.

3. With consideration to factors listed throughout this thesis, determine what you would like to do; determine what type of program you would like to implement and what products you would like to recycle.

    a. Type of program: there are several types of recycling programs including drop-off sites, curbside, and hybrid models. Drop-off sites include shed, dumpster, and other types. Curbside methods include source separated, dual stream, single stream, and other methods. Hybrid models mix the above types. This is often done, for example, where curbside is only available to single-family households, or in communities with both urban and rural areas. Curbside programs are recommended as they result in the highest potential recycling rate. Remember, as was suggested by the findings in this study, once you go curbside there is no going back.

b. Type of products recycled: the product that you would like to recycle is heavily dependent on the processor in the area. What will they accept and what will they not accept? Take into consideration costs involved and determine what is economically feasible. Various chapters throughout this thesis discuss other factors that would influence decisions related to this process.

4. Determine program costs and program funding. The literature review chapter and the findings chapters provide additional information on processes related to costs and funding structures. Determine costs and funding for both implementation and operation of the program. Ensure that costs related to building the infrastructure, hauling the recyclable material, processor fees, promotional material costs, educational programs costs, and miscellaneous fees and costs are considered. Use other communities as a model.

5. Begin the process of building partnerships and agreements. Discuss and develop partnerships and agreements with both private and public entities where appropriate. Consider how the infrastructure will be built. Determine how the recyclable material will be collected, how it will be hauled, and how it will be processed; determine what partnerships and agreements are needed for these processes. Consider partnerships and agreements for promotional and educational programs. Ensure that legal and policy factors are considered and complied with.

6. Begin the implementation process and use other communities as models. Ensure that a strong informational/promotional campaign is implemented. It is imperative that residents understand how to recycle, what products can be recycled, and the importance and value in recycling. If residents lack recycling knowledge an unsuccessful program will likely result, this is due to lack of involvement and contamination. Step-by-step instructions, with pictures, should be used when describing how to recycle; this is especially important with curbside programs. Ensure that descriptions and pictures are provided when describing what can and cannot be recycled. Show examples of products that can be recycled, use examples of things that cannot be recycled, Appendix C provides examples of these materials. Provide examples as rationale to the importance and value of recycling. Include information related to both the importance to our environment as well as potential costs savings to the residents, where applicable (an example would be a program that offers free recycling but charges for waste, based on volume).

7. During the implementation process, shortly after implementation, and at regular intervals thereafter, review the program. Ensure that the needs of the residents are met, that residents understand how to recycle, that residents are recycling, and that residents understand the value of recycling. Determine areas that can be modified and enhanced. Hold meetings with residents to get input that is more direct. Set goals and milestones.

The above outlined an overview of steps that can be taken when implementing a recycling program. While these steps are not all-inclusive and can vary for each community, they provide a framework that can be used. In addition to the steps provided above, one should consider all of the factors presented throughout this thesis, as they have an impact on recycling programs.

Enhancing Recycling Programs

Many factors and processes must be considered when attempting to enhance a recycling program. Below is a list of recommendations to consider when looking at enhancing recycling programs. Other findings throughout this thesis should also be considered.

1. Before you can enhance your recycling program, you must understand the program and know what aspects you would like to enhance. It is recommended that a study of the current program be completed. This study would include information such as tons recycled, tons landfilled, participation rates, effectiveness, costs, goals, and related factors. After completion of this study, it is essential to include all stakeholders, especially residents, in the discussion and decisions. For the program and changes to be successful, the residents must have ownership of the program.

2. When determining the desired areas of enhancement the discussion throughout this thesis would prove to be most useful. The literature review chapter describes why people may or may not recycle. This is information is essential in gaining

involvement. It is important to understand how financial, environmental, landfill and waste management, planning, and personal factors play into this; the literature review chapter reviews these factors. Additionally, the factors presented in the findings chapters also present factors to take into consideration.

3. After identifying areas of enhancement, consider the costs and feasibility of the enhancements. Determine if it is economically feasible to make the recommended changes, determine if funds available. Decide if the necessary political support is present. Can the infrastructure handle the changes? If not, determine if the desired enhancements are financially feasible. Determine if the recyclable processor will be able to meet the demands of the change and if so will they adjust to the enhancements.

4. During the implementation of the enhancements, information is key. Residents of the community and other stakeholders must understand the changes. Implement informational campaigns that describe the new process, what is recycled, how to recycle, and why there were changes. Additionally, show the value of the change. Examples of the changes, with graphics, will help residents understand the change.

5. Review the enhancements. Determine if goals have been met, if goals have not been met, determine why. Review the factors described throughout this thesis to determine if one of them may have an influence on the area that was enhanced. If you are trying to improve recycling in a neighborhood, take into consideration personal and social factors that influence recycling decisions, such as

neighborhood leader program that promotes recycling through verbal cues and modeling behavior.

The above factors and processes provide a usable framework when attempting to enhance a recycling program. While the factors are not all-inclusive, they provide a guide of potential steps. It is essential to remember that these steps and processes will vary by community; however, determining the desired changes, doing adequate research, identifying resident wants, ensuring that the changes are feasible, and educational programs are essential in enhancing programs.

Further Research

These topics warrant further research. Much more data should be gathered that could be generalized into many areas. Further research could dive deeper into the questions: 1. What factors result in the implementation of successful recycling programs? 2. What social, economic/financial, and administrative factors influence the decisions as to whether or not to implement community-wide recycling programs in communities of various sizes? 3. What challenges, costs, and community structures influence recycling program decisions?

Additionally there are many opportunities for looking at recycling at the community level. Most research focuses around the individual level, leaving a large gap at the meso and macro levels. Further research could study communities of various sizes across the United States or the world. A quantitative approach could be taken by looking at raw numbers of tons recycled and comparing that information to the presence of

recycling policies or ordinances, specific social-demographic factors, or any of the other

factors that were discussed throughout this thesis. Many opportunities exist for

expanding on research of recycling programs at the meso and macro levels.

CHAPTER 9. CONCLUSIONS

This study identified factors that influence community-wide recycling programs. More specifically the study identified what factors result in the implementation of successful recycling programs. Furthermore, this study identified social, economic/financial, and administrative factors that influence the decisions as to whether or not to implement community-wide recycling programs in communities of various sizes. Factors related to partnerships, costs, and community structures were also identified as having an impact on community-wide recycling program decisions.

Factors Influencing the Implementation of Successful Recycling Programs

Themes related to factors that influenced the implementation of successful recycling programs include identification of What Constitutes a "Successful" recycling program, products recycled, recycling facilities and equipment, the development of recycling markets, strategies to encourage community-wide recycling.

Social, Economic/Financial, and Administrative Factors

Several themes covering a vast set of attributes were identified in relation to social, economic, and administrative factors that influence community-wide recycling program decisions. An outline of each theme and its sub-attributes and factors are below.

Social Factors

Several factors were identified that related to social factors that influenced community-wide recycling program decisions. Social-demographic factors related to age

were present as well as community recycling advocates that influence community-wide

recycling program decisions.

Economic/Financial Factors

Economic and financial factors of various types were noted as influencing

community-wide recycling program decisions. These factors include decisions based on

availability of funds within a community, policies related to waste generation and

encouraging recycling based on community fees, the economics of recycling markets, and

decreasing the cost and increasing efficiency within communities.

Administrative Factors

Administrative factors were a large driving force of attributes that affected

community-wide recycling program decisions. These factors included recycling related

ordinances and policies, decisions based on land filling and recycling capabilities, the

political process, setting of goals, state and federal mandates and recommendations,

market availability, technology-based capabilities and limits, and environmental factors.

Partnerships, Costs, and Community Structure

When looking at partnerships, costs, and community structure that influence

recycling program decisions several themes became visible. Such themes relate to

recycling costs, recycling partnerships, and other factors.

Partnerships

Public-public, public-private, and private-private partnerships within a community

and surrounding areas influence decisions related to recycling. These partnerships proved

to be beneficial to communities of various sizes. Additionally, public-private partnerships were imperative in the success of many recycling programs.

Costs

Cost to communities and recycling organizations was a reoccurring theme related to factors that influence recycling program decisions. One must consider program costs related to both the implementation process as well as ongoing costs. Hauling expenses and ongoing expenses were different between urban and rural communities.

Community Structure

Several other factors influence community-wide recycling program decisions. These factors include population stratification based on social class, population distribution, and community specific factors.

This study provided much insight into an area with little previous research. While this study is not all-inclusive and was limited geographically, the information it collected provides a good framework to work off. Additionally, much information contained in this thesis is useful to anyone looking at implementing a community-wide recycling program or someone looking for a way to improve their recycling program. It was my hope with this project that I would be able to provide a framework to help those interested in developing or improving recycling programs. I also hoped to provide an expandable framework for others to build upon with further research. This thesis is that framework.

REFERENCES

Becker County, Environmental Services Department. (2009). *SCORE Data.*

Becker County, Environmental Services Department. (2010). *Waste Reference Guide.*

Berg, B. L. (2009). *Qualitative Research Methods for the Social Sciences.* Boston: Allyn & Bacon.

Blau, P. M. (1964). *Exchange and Power in Social Life.* New York: John Wiley & Sons Inc.

Blau, P. M. (1994). Formulation of Exchange Theory. In P. Kivisto (Ed.), *Social Theory: Roots and Branches (Readings)* (pp. 314-320). Los Angeles, California: Roxbury Publishing Company.

Carson, R. (1962). *Silent Spring.* Houghton Mifflin.

Creswell, J. W., & Plano Clark, V. L. (2007). *Designing and Conducting Mixed Methods Research.* Thousand Oaks, CA: Sage.

Derksen, L., & Gartrell, J. (1993). The Social Context of Recycling. *American Sociological Review, 58*(3), 434-442.

De Young, R. 1985-1986. Encouraging Environmentally Appropriate Behavior: The Role of Intrinsic Motivation. *Journal of Environmental Systems,* 15(4), 281-92.

De Young, R. 1986. Some Psychological Aspects of Recycling. *Environment and Behavior,* 18(4), 435-49.

De Young, R. 1990. "Recycling as Appropriate Behavior: A Review of Survey Data From Selected Recycling Education Programs in Michigan." Resources, Conservation and Recycling 3(4):253-266.

Egri, C. P., & Herman, S. (2000, August. Leadership in the North American Environmental Sector: Values, Leadership Styles, and Contexts of Environmental Leaders and Their Organizations. *The Academy of Management Journal, 43*(4), 571-604. Retrieved from Stable URL: http://www.jstor.org/stable/1556356

Ekeh, P. P. (1974). *Social Exchange Theory: The Two Traditions.* Cambridge, Massachusetts: Harvard University Press.

Eureka Recycling. (Producer). (2009). How to Recycle in Your Neighborhood.

Eureka Recycling. (Producer). (2010). Recycling Sorting Guide.

Fielding, K. S., McDonald, R., & Louis, W. R. (2008). Theory of planned behaviour, identity and intentions to engage in environmental activism. *Journal of Environmental Psychology, 28*, 318-326.

Fier, B. (Photographer). (2009).

Fier, B. (Photographer). (2010).

Green, S. L. (2002). *Rational Choice Theory: An Overview.* Informally published manuscript, Department of Economics, Hankamer School of Business, Baylor University, Waco, Texas. Retrieved from http://business.baylor.edu/steve_green/green1.doc

Hechter, M., & Kanazawa, S. (1997). Sociological Rational Choice Theory. *Annual Review of Sociology*, 23, 191-214.

Highfill, J., & McAsey, M. (2001). Landfilling Versus "Backstop" Recycling When Income Is Growing. *Environmental and Resource Economics, 19*, 37-52.

Hopper, J. R., & Nielsen, J. M. (1991). Recycling as Altruistic Behavior: Normative and Behavioral Strategies to Expand Participation in a Community Recycling Program. *Environment and Behavior, 23*(2), 195-220.

Hornsey, M. J., Blackwood, L., Louis, W., Fielding, K., Mavor, K., Morton, T., OBrien, A., Paasonen, K., Smith, J., & White, K. (2006). Why do people engage in collective action? Revisiting the role of perceived effectiveness. *Journal of Applied Social Psychology*, 36, 1701–1722.

Howenstine, E. (1993). Market Segmentation for Recycling. *Environment and Behavior, 25*, 86-102.

Linear programming. (2010). In *Merriam-Webster Online Dictionary*. Retrieved 2010, from http://www.merriam-webster.com/dictionary/linear programming

Lund, J. R. (1990, January/February). Least-Cost Scheduling of Solid Waste Recycling. *Journal of Environmental Engineering, 116*(1), 182-197.

McFarlane, B. L., & Boxall, P. C. (2003). The role of social psychological and social structural variables in environmental activism: An example of the forest sector. *Journal of Environmental Psychology*, 23, 79–87.

McFarlane, B. L., & Hunt, L. M. (2006). Environmental activism in the forest section. *Environment and Behavior*, 38, 266–285.

Minnesota Pollution Control Agency (MPCA). (2010). *2009 Solid Waste Policy Report Appendices* (lrw-ps-1sy09). Saint Paul, MN: Retrieved from http://www.pca.state.mn.us/publications/lrw-sw-1sy10_appendices.pdf

Mississippi Department of Environmental Quality, State of Mississippi Task Force on Recycling. (2003). *State Recycling Survey Information* Mississippi: Retrieved from http://deq.state.ms.us/MDEQ.nsf/page/SW_State_Recycling_Survey_Information?OpenDocument

Morris, J. (2005). Comparative LCAs for Curbside Recycling Versus Either Landfilling or Incineration with Energy Recovery. *The International Journal of Life Cycle Assessment, 10*(4), 273-284.

Oom Do Valle, P., REBELO, E., REIS, E., & MENEZES , J. (2005). Combining Behavioral Theories to Predict Recycling Involvement. *Environment and Behavior*, *37*.

Oskamp, S., Harrington, M. J., Edwards, T. C., Sherwood, D. L., Okuda, S. M., & Swanson, D. C.(1991). Factors Influencing Household Recycling Behavior. *Environment and Behavior, 23*(4), 494-519.

Palatnik, R., Ayalon, O., & Shechter, M. (2005). Household Demand for Waste Recycling Services. *Environmental Management, 35*(2), 121-129.

Roussat, N., Dujet, C., & Méhu, J. (2008). Choosing a Sustainable Demolition Waste Management Strategy Using Multicriteria Decision Analysis. *Waste Management, 29*(1), 12-20.

Palmer, K., Sigman, H., & Walls, M. (1997). The Cost of Reducing Municipal Solid Waste. *Journal of Environmental Economics and Management, 33*, 128-150.

Pena, R, R., Rebollo , P, L., Oliveras, G,K., & Oliveras, G,A. (2007). *Use and Evaluation of Electre III/IV* . Retrieved from http://deim.urv.cat/recerca/reports/DEIM-RT-07-003.pdf

Schwartz, S. H. (1968a). Awareness of consequences and the influence of moral norms on interpersonal behavior. *Sociometry*, 31, 355-369.

Schwartz, S. H. (1968b). Words, deeds and the perception of consequences and responsibility in action situations. *Journal of Personality and Social Psychology*, 10(3), 232-242.

Schwartz, S. H. (1970) Elicitation of Moral Obligation and Self-Sacrificing Behavior: An Experimental Study of Volunteering to be a Bone Marrow Donor. *Journal of Personality and Social Psychology*, 15(4), 283-293.

Schwartz, S. H. (1973). Normative explanations of helping behavior: A critique, proposal, and empirical test. *Journal of Experimental Social Psychology*, 9, 349-364.

Schwartz, S. H. (1977). Normative influences on altruism. *Advances in Experimental Social Psychology*, 10, 221-279.

Scipioni, A., Mazzi, A., Mason, M., & Manzardo, A. (2008). The Dashboard of Sustainability to measure the local urban sustainable development: The Case Study of Padua Municipality. *Ecological Indicators 9, 9*, 364-380.

State of Minnesota, Minnesota Pollution Control Agency. (2010). SCORE Report.

The Clean Air Act, 42 U.S.C. §7401 et seq. (1970)

The Clean Water Act, 33 U.S.C. §1251 et seq. (1972)

Tonglet, M., Phillips, P., & Read, A. (2004). Using the Theory of Planned Behaviour to Investigate the Determinants of Recycling Behaviour: A Case Study From Brixworth, Uk. *Resources, Conservation and Recycling, 41*.

United States Census Bureau. (2000). *Decennial Census* Retrieved from http://factfinder.census.gov/

U.S. Census Bureau. (2006-2008). *The American Community Survey.* Retrieved from http://factfinder.census.gov/

U.S. Census Bureau. (2010). American FactFinder; map generated by Brian Fier. Retrieved from http://factfinder.census.gov; (March 2010).

United States Environmental Protection Agency, Solid Waste and Emergency Response. (2006a). *Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2005* (EPA-530-F-06-039). Washington, DC.

United States Environmental Protection Agency, Office of Solid Waste. (2006b). *Municipal Solid Waste in the United States: 2005 Facts and Figures* (EPA530-R-06-011). Washington, DC.

Vining, J., & Ebreo, A. (1990). What Makes A Recycler? A Comparison of Recyclers and Nonrecyclers. *Environment and Behavior*, 22(1), 55-73.

APPENDIX A. SUMMARY OF FINDINGS

The interviews with community and recycling officials presented several themes that defined attributes of recycling program decisions. These themes related to factors that influenced successful recycling program implementation; social, economic, and administrative factors that influence community-wide recycling program decisions; and partnerships, costs, and community structures that influence recycling program decisions

Factors Influencing the Implementation of Successful Recycling Programs

Themes related to factors that influenced the implementation of successful recycling programs include identification of what constitutes a "successful" recycling program, products recycled, recycling facilities and equipment, the development of recycling markets, and strategies to encourage community-wide recycling.

What Constitutes a "Successful" Recycling Program?

Four themes related to what constitutes a "successful" recycling program were identified. Community ownership, public participation, societal influences, and education were common themes in communities that were considered to have successful recycling programs.

Products Recycled

Determining the products that are collected for recycling purposes is essential in developing a successful program. This decision is in coordination with what the recyclable processor will accept. Additionally, the residents of the community must understand what products can be recycled and what cannot be recycled.

Recycling Facilities and Equipment

Several methods can be employed to collect recyclables. Each method has advantages and disadvantages and requires various types of facilities and equipment. Several types of recycling collection facilities and equipment exist in the communities studied including recycling sheds, drop-off sites, curbside bins, and combinations of these types.

The Development of Recycling Markets

Within the communities studied, the recyclable processor has an unquestionable impact on recycling decisions within the communities. If the processor is unable to market certain recyclable materials then it does not make sense to collect this product. If markets cannot be established then effective and successful recycling programs cannot be developed.

Strategies to Encourage Community-Wide Recycling

Recycling officials in various communities suggested several means for encouraging recycling behavior among residents in their communities. The strategies included financial incentives, availability and convenience, and educational and informational campaigns.

Social, Economic/Financial, and Administrative Factors

Several themes covering a vast set of attributes were identified in relation to social, economic, and administrative factors that influence community-wide recycling program decisions. Each theme and its sub-attributes and factors are outlined below.

Social Factors

Several factors were identified that related to social factors that influenced community-wide recycling program decisions. Social-demographic factors related to age were identified as well as community recycling advocates that influence community-wide recycling program decisions.

Economic/Financial Factors

Economic and financial factors of various types were identified as influencing community-wide recycling program decisions. These factors include decisions based on availability of funds within a community, policies related to waste generation and encouraging recycling based on community fees, the economics of recycling markets, and decreasing the cost and increasing efficiency within communities.

Administrative Factors

Administrative factors were a large driving force of attributes that affected community-wide recycling program decisions. These factors included recycling related ordinances and policies, decisions based on land filling and recycling capabilities, the political process, setting of goals, state and federal mandates and recommendations, and market availability.

Partnerships, Costs, and Community Structure

When looking at partnerships, costs, and community structure that influence recycling program decisions several themes became visible. Such themes relate to recycling costs, recycling partnerships, and other factors.

Partnerships

Public-public, public-private, and private-private partnerships within a community and surrounding areas influence decisions related to recycling. These partnerships proved to be beneficial to communities of various sizes. Additionally, public-private partnerships were imperative in the success of many recycling programs.

Costs

Cost to communities and recycling organizations was a reoccurring theme related to factors that influence recycling program decisions. Consideration should be given to program costs related to both the implementation process as well as ongoing costs. Hauling expenses and ongoing expenses were different between urban and rural communities.

Community Structure

Several other factors were identified as influencing community-wide recycling program decisions. These factors include population stratification and distribution and community specific factors.

APPENDIX B. SAMPLE INTERVIEW FORMS

Interview with City Official (Recycling Already Implemented)

Name of Interviewer _____ Date of Interview _____

Place of Interview_____

City Name_____

Interviewee's Name_____

Phone Number _____ E-mail Address _____

1. Please describe your city's waste management structure. (Probes: How are wastes disposed of, what happens to recyclables, what are the community's long-term waste management goals?)

2. What types of recycling opportunities does your community have available to residents? (Probes: Has it always been this way, have any other types been considered or implemented?)

3. Tell us about the implementation of the recycling program (Probes: Why was this type implemented, what process was taken to implement this type, what factors were taken into consideration, how did political, financial, and administrative factors play into the decision?)

4. Tell us about community participation in recycling. (Probes: Participation rates, problems with unacceptable waste)

5. What steps were taken to gain community involvement. (Probes: How did you launch your recycling campaign, what sort of promotional materials were made available, have you reached out to disaffected groups?)

Interview with City Official (Recycling Not Implemented)

Name of Interviewer _____ Date of Interview _____

Place of Interview_____

City Name_____

Interviewee's Name_____

Phone Number _____ E-mail Address _____

1. Please describe your city's waste management structure. (Probes: How are wastes disposed of, what happens to recyclables, what are the community's long-term waste management goals?)

2. Has the city considered implementing recycling programs? (Probes: Have residents expressed a desire to recycle, what types of programs have been considered, what factors [IE: administrative, financial, political] were taken into consideration?)

3. Why was a program not implemented? (Probes: Has recycling been considered previously, what factors [IE: administrative, financial, political] influenced the decision, are there any pushes from within the community to implement a program, are any other recycling opportunities available within the community?)

Interview with Colleges/Universities (Recycling Already Implemented)

Name of Interviewer _____ Date of Interview _____

Place of Interview_____

City Name_____

Interviewee's Name_____

Phone Number _____ E-mail Address _____

1. Please describe your college's/university's waste management structure. (Probes: How are wastes disposed of, what happens to recyclables, what are the college's/university's long-term waste management goals?)

2. What types of recycling opportunities does your college's/university's have available? (Probes: Has it always been this way, have any other types been considered or implemented?)

3. Tell us about the implementation of the recycling program (Probes: Why was this type implemented, what process was taken to implement this type, what factors were taken into consideration, how did political, financial, and administrative factors play into the decision?)

4. Tell us about college's/university's participation in recycling. (Probes: Participation rates, problems with unacceptable waste)

5. What steps were taken to gain college's/university's community involvement. (Probes: How did you launch your recycling campaign, what sort of promotional materials were made available, have you reached out to disaffected groups?)

6. How does your recycling program tie into the community's program or lack of program? (Probes: Do you work with them or is it independent, do you allow for students/faculty/staff to bring in recyclables?)

Interview with Colleges/Universities (Recycling Not Implemented)

Name of Interviewer _____ Date of Interview _____

Place of Interview_____

City Name_____

Interviewee's Name_____

Phone Number _____ E-mail Address _____

1. Please describe your college's/university's waste management structure. (Probes: How are wastes disposed of, what happens to recyclables, what are the college's/university's long-term waste management goals?)

2. Has the college/university considered implementing recycling programs? (Probes: Have students/faculty/staff expressed a desire to recycle, what types of programs have been considered, what factors [IE: administrative, financial, political] were taken into consideration?)

3. Why was a program not implemented? (Probes: Has recycling been considered previously, what factors [IE: administrative, financial, political] influenced the decision, are there any pushes from within the college/university to implement a program, are any other recycling opportunities available within the local community?)

Interview with Recycling Organizations

Name of Interviewer _____ Date of Interview _____

Place of Interview_____

City Name_____

Interviewee's Name_____

Phone Number _____ E-mail Address _____

1. What type of recycling organization are you? (Probes: for-profit or non-profit, community based, quasi-governmental organization)

2. Describe the recycling services you offer. (Probes: what types of recyclables [paper, glass, metals, wastes], where do you collect recyclables from [commercial, residential, industrial, curbside, drop-off sites, schools], how are you contracted, who are your competitors, where do you process recyclables?)

3. What factors influenced your decision to collect recyclables in the community? (Probes: financial, political, administrative, other.)

4. Tell us about the implementation of the recycling programs in the communities you serve (Probes: Why was this type implemented, what process was taken to implement this type, what factors were taken into consideration, how did political, financial, and administrative factors play into the decision?)

5. Tell us about community participation in recycling. (Probes: Participation rates, problems with unacceptable waste)

Interview with Waste Management Companies

Name of Interviewer _____ Date of Interview _____

Place of Interview_____

City Name_____

Interviewee's Name_____

Phone Number _____ E-mail Address _____

1. Describe the waste management services that you offer. (Probes: what types of waste [commercial, residential, industrial], how are you contracted, who are your competitors, where do you dispose of the waste?)

2. How do recycling programs affect your business? (Probes: Positive and negative impacts, changes in waste amounts)

APPENDIX C. IRB MATERIALS

NDSU   **North Dakota State University**

Department of Sociology, Anthropology, and Emergency Management
PO Box 6050
Fargo, ND 58108-6050
701-231-7637

Factors Influencing the Implementation of Community-Wide Recycling Programs

My name is Brian Fier. I am a graduate student in the Natural Resources Management Program at North Dakota State University, and I am conducting a research project to determine factors that influence the implementation of community-wide recycling programs. It is our hope, that with this research, we will learn more about the process that is undertaken when determining if a community-wide recycling program will be implemented and if so what factors resulted in it being successful or not.

Because you are a stakeholder related to recycling/waste management, you are invited to take part in this research project. Your participation is entirely your choice, and you may change your mind or quit participating at any time, with no penalty to you.

It is not possible to identify all potential risks in the interview, but the researchers have taken reasonable safeguards to minimize any known risks.

You are not expected to get any benefit from being in this research study. However, benefits to others are likely to include a better understanding of the processes related to the implementation of a successful recycling program.

The interview should take about 60 minutes to complete. The questions pertain to your experiences related to recycling and waste management, knowledge of policies and procedures related to recycling and waste management, and recycling implementation processes. We will audio record the interview as a way to help us take notes. The audio recording and related materials will be safeguarded during the analysis phase of the study and will be destroyed for privacy reasons upon completion of the study. If you desire, you may request a copy of the final report upon its completion.

We will keep private all research records that identify you to the extent allowed by law. Your information will be combined with information from other people taking part in

the study. We will write about the combined information that we have gathered. You will not be identified directly in these written materials. We may publish the results of the study; however, we will keep your name and other identifying information private.

If you have any questions about this project, please call me at 563-505-7242.

You have rights as a research participant. If you have questions about your rights or complaints about this research, you may talk to the researcher or contact the NDSU Human Research Protection Program at 701.231.8908, ndsu.irb@ndsu.edu, or by mail at: NDSU HRPP Office, NDSU Dept 4000, PO Box 6050, Fargo, ND 58108-6050.

Thank you for your taking part in this research. If you wish to receive a copy of the results, we shall provide a copy of the report upon request.

NDSU

May 26, 2009

Gary Goreham and Brian J. Fier
Dept of Sociology, Anthropology, and Emergency Management
Minard Hall 404E

Re: Your submission to the IRB: "Factors Influencing the Implementation of Community-Wide Recycling Programs"
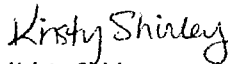
Thank you for your inquiry regarding your project. At this time, the IRB office has determined that the above-referenced protocol does not require Institutional Review Board approval or certification of exempt status because it does not fit the regulatory definition of 'research involving human subjects'.

Dept. of Health & Human Services regulations governing human subjects research (45CFR46, *Protection of Human Subjects*), defines 'research' as "... a systematic investigation, research development, testing and evaluation, designed to contribute to generalizable knowledge." These regulations also define a 'human subject' as "... a living individual about whom an investigator conducting research obtains (1) data through intervention or interaction with the individual, or (2) identifiable private information."

It was determined that your project does not require IRB approval (or certification of exempt status) because the project does not collect information about the interviewees. The board makes this determination conditional on the same interview questions provided in the protocol submitted on 5/22/2009.

We appreciate your intention to abide by NDSU IRB policies and procedures, and thank you for your patience as the board has reviewed your study. Best wishes for a successful project!

Sincerely,

Kristy Shirley

Kristy Shirley
Research Compliance Administrator

120

BECKER COUNTY

ENVIRONMENTAL SERVICES

BECKER COUNTY REGIONAL HOUSEHOLD HAZARDOUS WASTE (HHW) FACILITY
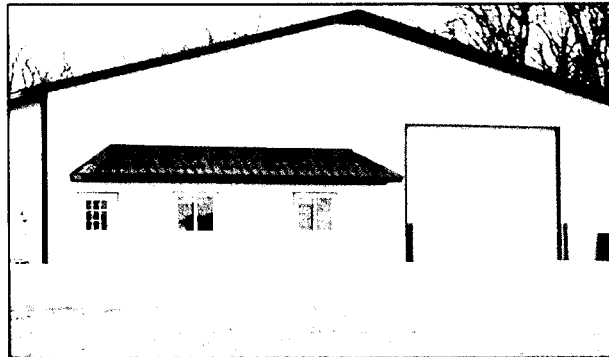
24455 County Road 144

3 Miles North of Detroit Lakes on Hwy 59, & 1/4 Mile West on County Road 144

(The Driveway East of the Transfer Station)

218-847-9664

OPEN: Wednesday   8:00 AM - 4:30 PM

April—October

COME VISIT OUR FREE PRODUCT EXCHANGE!

ACCEPTABLE ITEMS:

Paints	Poisons
Stains	Adhesives
Varnishes	Aerosol Cans
Solvents	Lawn care products
Garden pesticides	Cleaners
Flammable products	Automotive chemicals

UNACCEPTABLE ITEMS:

NO Empty containers
NO Business Waste-
     (Household Only)
NO Agricultural, industrial,
     motor oil or filters

WASTE REFERENCE GUIDE

Printed on Recycled Paper ♻

BECKER COUNTY TRANSFER STATION
AND DEMOLITION LANDFILL

Located 3 miles North of Detroit Lakes on Hwy 59 and 1/2 mile West on County Road 144

PHONE: 218-847-6382

MONDAY: 8:00 AM - 6:00 PM

TUESDAY-WEDNESDAY-THURSDAY: 8:00AM-4:30PM

FRIDAY: 8:00 AM - 6:00PM

SAT. 8:00AM-NOON

HOUSEHOLD GARBAGE (LOOSE)	$9.40/YARD + TAX	
COMPACTED GARBAGE		**FREE FOR RESIDENTIAL & BUSINESSES**
In County Haulers	$62.00 /TON	
DEMOLITION	$ 8.00/YARD (Includes Tax)	*Appliances* *Bulbs (limit 10)*
RECYCLED DEMOLITON	$4.00 (Include Tax)	*Tires (passenger vehicle) (limit 4)*
Includes: asphalt and concrete		*Waste Oil* *Oil Filters*
APPLIANCE	FREE	*Auto Batteries* *Ballasts (limit 4)*
ELECTRONICS	$5.00	
MISC. METAL	FREE	
CAR TIRE	$2.50	
With rim	$5.00	YOU MAY DISPOSE OF YOUR HOUSEHOLD HAZARDOUS WASTE AT THE TRANSFER STATION DURING REGULAR BUSINESS HOURS
TRUCK TIRE	$10.00/UNIT	
With rim	$20.00/UNIT	
TRACTOR TIRE	$ .10/POUND	
MATTRESS/BOX SPRING + TAX	$4.27 UNIT	

YARD WASTE

BRUSH - SMALL QUANTITY   (Non Commercial)   FREE

BRUSH - TRUCKLOAD (COMMERCIAL) $15.00

FLUORESCENT BULBS -

FOR LARGE LOADS PLEASE CALL TRANSFER STATION FOR DUMPING TIMES

4' & under   = 50 cents

over 4'   = 75 cents

Misc. bulbs   = SEE ATTENDANT

RECYCLING

Call Becker County Environmental Services at 218-846-7310 for Shed Locations or Bring Recyclables to MinnKota Recycling (847-4790) –Hwy. 59, N., Detroit Lakes

CANS
Clean Aluminum cans, separated from clean Tin or Steel cans — no need to remove labels. Also dried empty paint cans (lid removed) and empty aerosol cans.

CARDBOARD/PAPERBOARD
Corrugated and brown paper grocery bags broken down and flattened. Must be clean. Paperboard such as: pop boxes, Kleenex or cereal box material.

GLASS
Clear, brown or green bottles, jugs or jars. Must be clean with cap removed. NO LIGHT BULBS, MIRRORS, WINDOW GLASS, DISHES, DRINKING GLASSES, OVEN-WARE CERAMICS OR VASES

MAGAZINES
ALL magazines and small catalog flyers .
No Catalogs, TV Guides, Readers Digest, Books or Wrapping Paper!

MIXED PAPER
ALL junk mail and brochures and telephone books

NEWSPAPER
Newspapers, shopper and anything delivered with a Sunday paper is acceptable.

OFFICE PAPER
White or light colored bond paper, white index cards, computer paper, manila file folders, adding machine paper, envelopes (with or without windows), copy or fax paper.

PLASTIC BOTTLES
ONLY screw top bottles, with a 1 or 2 on the bottom. Only narrow necked bottles. NO!!! Yogurt, Cottage Cheese, Motor Oil, Plastic Wrap, Bags, Packaging or **Disposable Diapers.**

TELEPHONE BOOKS
TELEPHONE BOOKS are accepted in the recycling sheds in mixed paper barrel. Also, LORETEL Systems in Frazee, Audubon, Cormorant and Lake Park, have containers in front of their office year round. Arvig Communication Systems has collection containers in their offices also.

PENNY PER POUND PAPER
RECYCLING PROGRAM

USE PAPER BAG OR BOXES
TO BRING SORTED   PRODUCTS TO
MINNKOTA RECYCLING (NORTH ON HWY 59)
AND RECEIVE ONE CENT PER POUND FOR THE PAPER

YOU CAN EVEN DONATE YOUR PROCEEDS   *TO YOUR FAVORITE*
CHARITY

Acceptable Paper:

Paper: White or pastel colored bond paper, white typing paper, index cards, envelopes with or without windows. Premium bond computer print out paper, legal pad paper and adding machine tape.

Newspaper: along with glossy inserts are recyclable. This includes anything delivered in your Sunday paper. Shoppers and other publications printed on newspaper stock.

Magazines: Only magazines with glossy pages. Absolutely no Readers Digest, TV Guide or Catalogs please.

Only clean, sorted materials of these types will be accepted. Dirty and commingled will be rejected and have no redeemable value.

BECKER COUNTY HAS FORTY-SIX RECYCLING SHEDS THROUGH- OUT
   THE COUNTY TO MAKE IT EASIER FOR YOU TO RECYCLE.
FOR THE SHED LOCATION NEAREST YOU, PLEASE CALL BECKER
   COUNTY ENVIRONMENTAL SERVICES AT 218-846-7310

Figure D1. Becker County Environmental Services Guide.
Source: Becker County Environmental Services, 2010.

Together
we are proving that
waste is preventable.

Every day we keep 75 truckloads of valuable materials from being wasted in a landfill or incinerator. This adds up to over 100 million pounds of bottles, cans, cardboard and paper every year!

Composting started with a few dedicated backyard composters and has grown into a movement in the Twin Cities to make dirt, not waste!

There is a growing effort to require producers to take responsibility for products that are wasteful and harmful to us and our environment. Minnesota citizens and elected officials are taking action!

Contact us for more information
(651) 222-SORT (7678) www.eurekarecycling.org
info@eurekarecycling.org

EUReKA!
ReCYCLING

EUReKA!
ReCYCLING

Every day we
reduce waste and
make a difference
in our
community.

EUReKA!
ReCYCLING

Your 2010 Guide to Recycling

Figure D2. Eureka Recycling - Recycling Guide.
Source: Eureka Recycling, 2009.

Figure D3. Recycling Sorting Guide.
Source: Eureka Recycling, 2010.
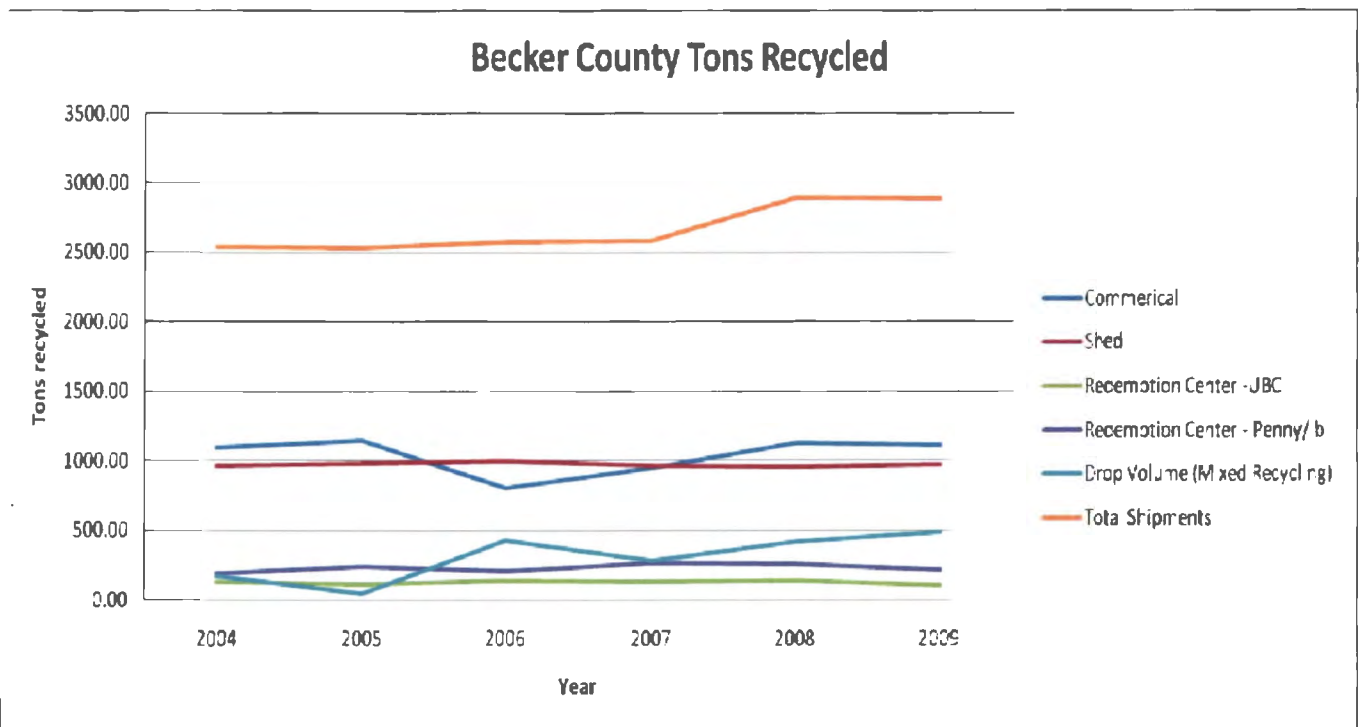
Figure E1. Becker County Tons Recycled.
Source: Becker County, 2009.
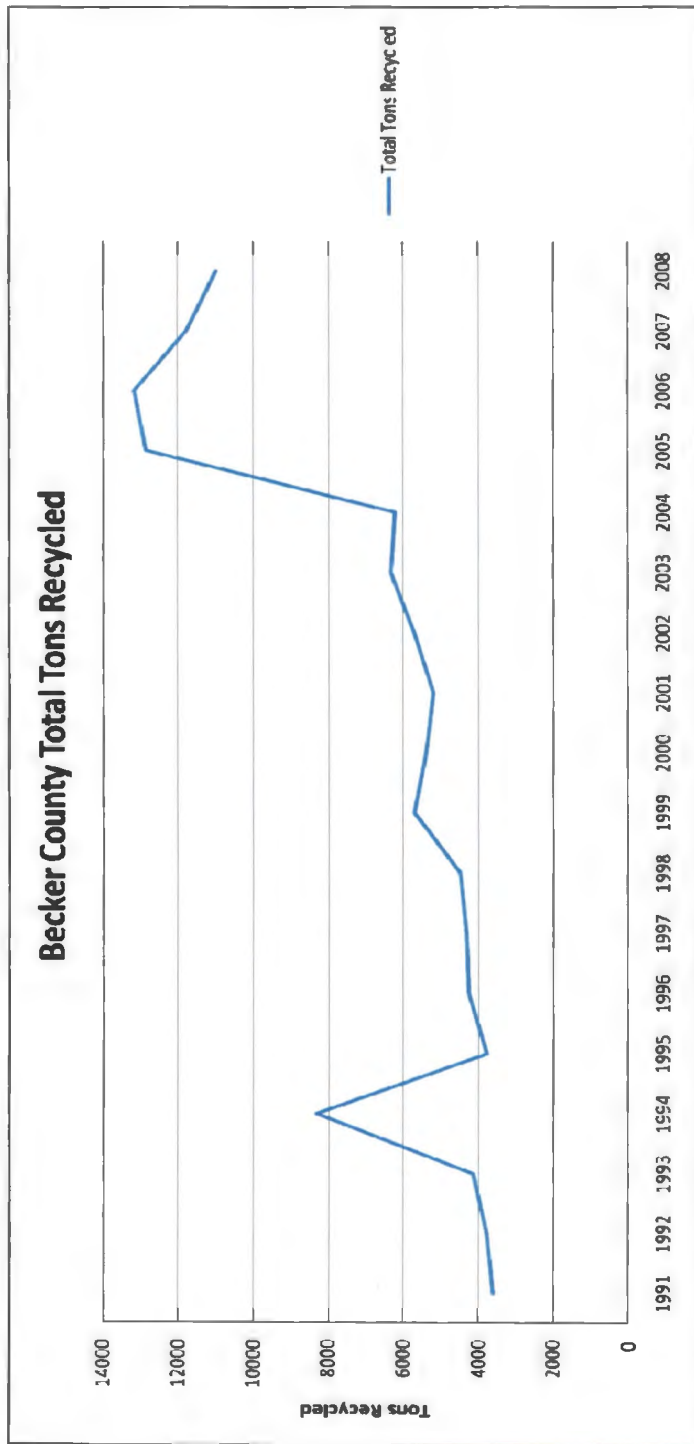
APPENDIX E. SCORE DATA

128

Figure E2. Becker County Total Tons Recycled.
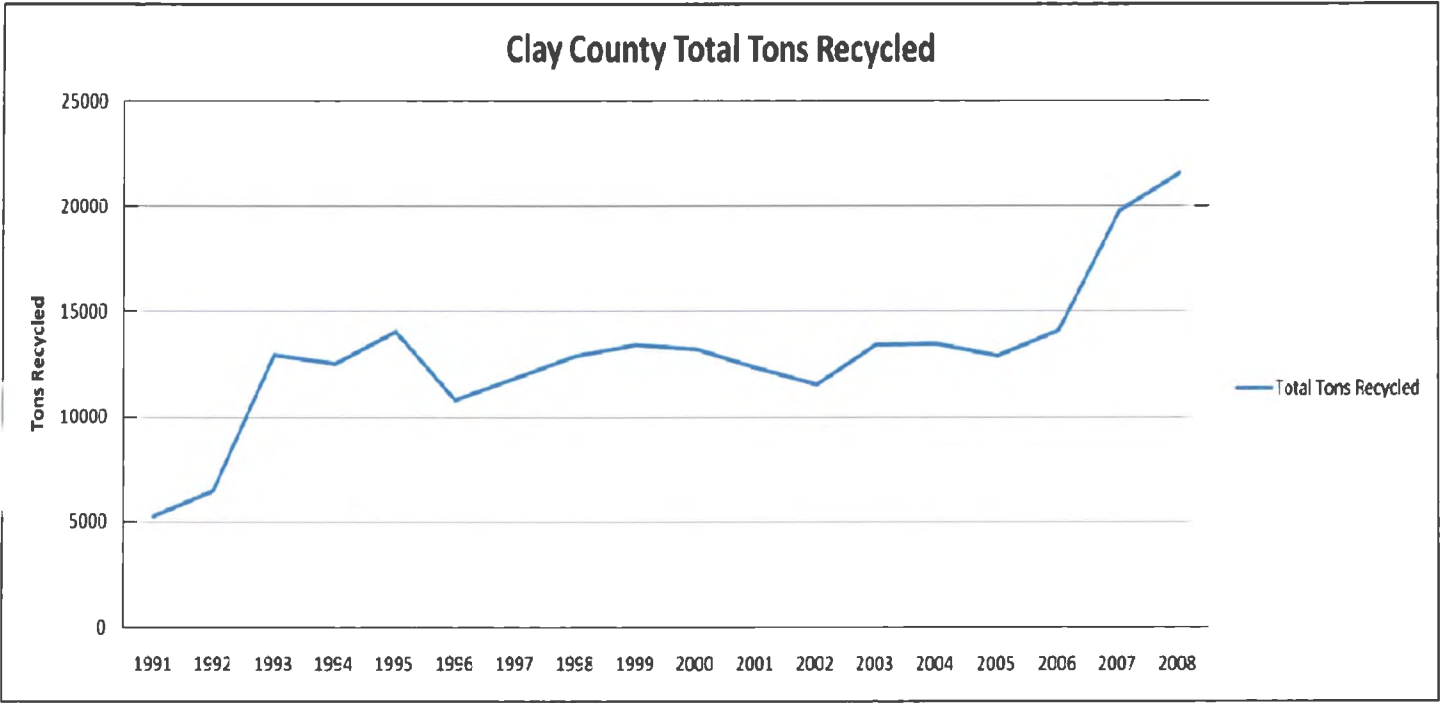Source: State of Minnesota, 2010.

Figure E3. Clay County Total Tons Recycled.
Source: State of Minnesota, 2010.

130

APPENDIX F. STATE RECYCLING AND LANDFILL MANDATES

Table F1. State Recycling and Landfill Mandates.

State	Mandate for Residents to Recycle	Notes
Alabama	Limited	Mandatory for public schools & state agencies
Alaska	None	Residents are not required to recycle
Delaware	None	Residents are not required to recycle
Georgia	None	Residents are not required to recycle
Idaho	Limited	Mandatory for lead-acid batteries
Iowa	Limited	Recycling mandate decided on a local level
Maine	Limited	Recycling mandate decided on a local level
Michigan	None	Residents are not required to recycle
Minnesota	None	No mandate for individuals to recycle, however the counties must offer a recycling program
Nebraska	Limited	No state mandate, municipalities may have mandates
Nevada	None	No mandate for individuals to recycle, however some counties must offer a recycling program
North Carolina	Limited	No mandate for individuals to recycle, however some counties must offer a recycling program
North Dakota	None	Residents are not required to recycle
Oklahoma	Limited	Voluntary for residents, mandatory for agencies and entities under the law
Oregon	None	No mandate for individuals to recycle. Recycling has to be offered to the resident in many cases
Pennsylvania	Limited	Recycling is mandatory for municipalities over 10,000 persons and for municipalities with 5,000 to 10,000 persons and 300 persons per square mile.
South Carolina	None	Each county is required to offer a program, residents are not required to use the program
Tennessee	None	Residents are not required to recycle
Texas	None	Residents are not required to recycle
Utah	None	Residents are not required to recycle
Vermont	None	Residents are not required to recycle
Virginia	Limited	Some communities have mandatory recycling
West Virginia	Limited	Recycling is mandated for communities with populations of 10,000+
Washington	None	Local and regional solid waste planning units maintain a minimum 25% recycling rate

Source: Mississippi Department of Environmental Quality, (2003). *State Recycling Survey Information.*