

AN ANALYSIS OF COMMUNITY PARTICIPATION
IN THE RECYCLING PROGRAM
OF OWASSO, OKLAHOMA

By

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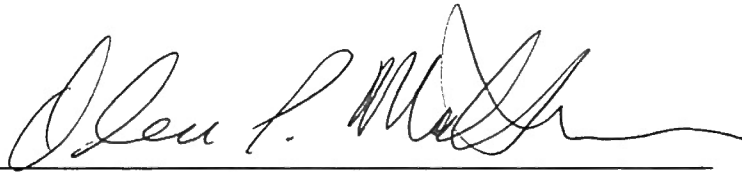
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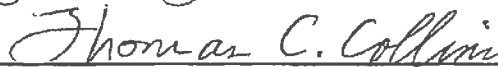
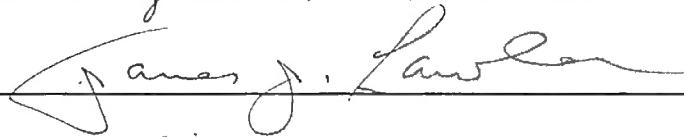
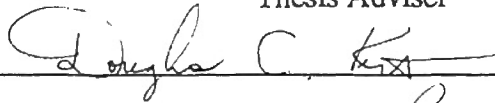
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CHAPTER I

INTRODUCTION

As the age of environmental awareness establishes itself in the 1990s individuals, organizations, and communities are expressing a desire for environmental security. To accomplish this goal, a safe and conscientious solid waste program that includes community and household recycling is seen as one way to reduce landfill volume by involving the public. The production of solid waste is a function of everyone's daily routines and activities. The quantity of waste is growing while the number of landfill disposal sites are diminishing. Solid waste disposal problems vary regionally according to population, geography, and geology.

Federal legislation for solid waste disposal practices were updated in 1976 after the Resource Conservation and Recovery Act (RCRA) was amended to the Solid Waste Disposal Act (SWDA). Subtitle D of RCRA, 40 Code of Federal Regulations (CFR) Part 247, sets management standards for federal, state, and local government's solid waste disposal practices. The federal role is limited to setting the minimum regulatory requirements, and the states and local governments must implement these requirements as approved by the federal government (Environmental Protection Agency, 1989). Administration of solid waste programs typically remain in the hands of state and local governments.

In 1984, Congress passed the Hazardous and Solid Waste Amendments (HSWA). HSWA sets forth aggressive action by requiring the Environmental Protection Agency (EPA) to revise the landfill regulations under Subtitle D (40 CFR Part 247) (Environmental Protection Agency, 1989). HSWA establishes mandatory, minimal technical requirements

for environmentally acceptable facilities, and requires that EPA revise landfill standards in Subtitle D. Once the revisions were finalized and the new regulations were promulgated, states had 18 months to comply (Coffman, 1991). In the fall of 1991, the EPA finalized the revisions of the HSWA amendments.

Many of the revisions made by the EPA relating to HSWA will lead to an increase in costs in most all solid waste disposal procedures including opening, maintaining, operating, and closing landfill facilities. If and when landfill facilities are in full compliance with these regulations, user fees for the landfills are anticipated to increase. Those facilities which cannot afford to comply will be forced to close, those landfills unable to comply will face expensive closure costs.

Since tipping fees are based on volume, or tonnage of materials, economy dictates users of landfills and governmental entities which use landfills must reduce waste in accordance with the proposed RCRA guidelines (see Appendix A). EPA recommends the reduction of solid waste disposed as one of the methods of dealing with solid waste disposal problems. States are encouraged by the EPA to design a solid waste management plan which goes well beyond the current federal requirements (Environmental Protection Agency, 1989).

Since the new regulations were published as proposed standards in 1988, many states pushed to achieve, if not surpass, the new solid waste disposal regulations established by the federal government. Those who chose to ignore the proposed standards are predicted to experience an increase in landfill closures and in costs for solid waste disposal. Oklahoma will experience these increases.

The Solid Waste Management Service of the Oklahoma State Department of Health administers and sets standards for solid waste disposal. These standards were most recently amended on April 2, 1987 and need to be revised again in accordance with the passage of the 1989 EPA regulations.

Oklahoma lacks state regulations encouraging waste reduction practices. In November of 1990, a study of recycling options for Oklahoma were submitted by Deyle and James of the Science and Public Policy Program of University of Oklahoma. Deyle and James (1990) prepared this study for the Governor of Oklahoma and a Special Committee on Solid Waste, Recycling and Disposal of the Oklahoma House of Representatives. Though there are no regulations for waste recovery and minimization, three major goals identified by the State Legislature and the Office of the Governor are included in Volume II of Recycling Options for Oklahoma (Deyle and James, 1990) including:

Promote state economic development by enhancing recycling industries in the State and ensuring adequate waste management capacity for new industry.

Minimize future cost increases for municipal solid waste management in the State through increased recycling.

Reduce the negative impacts of solid and hazardous waste generation and disposal through increased waste reduction and minimization (p. 1).

Also included in the report is an investigation which answered questions including: who is recycling, what is recycled, where are the markets, and how much is recycled. The city of Owasso established a unique program, the only city owned and operated voluntary recycling program in Oklahoma. Owasso's recycling program, established in 1988, is serving as a model for other Oklahoma communities that want to use recycling to reduce solid waste.

By studying Owasso, as well as other recycling programs, communities are developing an understanding of what can be done to reduce waste by diverting recyclables. Many communities express a desire to change disposal habits by supporting recycling programs and reducing the amount of waste bound for landfills. Some Oklahoma communities are currently adopting a recycling program to best fit their community's solid waste disposal practices. In doing so, many have looked at Owasso's recycling center as a guideline for creating their own recycling programs.

Background Information

The Owasso Recycling Center and Convenience Station

Of all the recycling programs in Oklahoma, Owasso has the first and only combination "drop-off/buy-back" recycling establishment in the state (Deyle and James, 1990). The term "drop-off" refers to a convenient area where large bins or boxes are for the containment of recyclable materials brought by citizens (Environmental Protection Agency, 1989). The term "buy-back" enables citizens to be paid for the recyclables they bring to the recycling center (Environmental Protection Agency, 1989). "Buy-back" gives an incentive to the public to take recyclables to the center for cash rather than placing recyclables into the solid waste stream bound for the landfill (Deyle and James, 1990).

The convenience station, located at the recycling center, provides the citizens with a place to take refuse such as bulk items, white goods, or even household trash, for a small fee (Ray, 1988). Owasso's convenience station encourages citizens to curtail roadside dumping of materials. The center offers an opportunity for citizens to take an active part in cleaning up the environment of their community by properly disposing of materials.

According to Rodney Ray (1988), the city manager of Owasso, three goals were set when the decision was made to open the recycling center. The first goal was to reduce the volume of solid waste disposed in a landfill, with a long-term goal of 25% reduction in solid waste. The second was to provide a convenient method of recycling for the citizens of the community. The third was to offer the citizens the opportunity to clean up Owasso's environment by discouraging roadside dumping (Ray, 1988).

Since May of 1988, the city has been monitoring and documenting the activities of the recycling center. The city has collected data displaying collection rate, participation information, and any gains or losses the center has experienced. Using this data, the city has been able to trace the progress and attempt to correct the problems the program has encountered. From May 1988 to February 1990, the city was able to trace the volume of

recyclables collected at the center. Table I shows the amount of refuse diverted from the landfill as a result of the recycling center. Table II illustrates the slight decrease in tons of refuse disposed from 1989 to 1990.

TABLE I
 RECYCLABLE MATERIALS COLLECTED BY
 THE OWASSO RECYCLING CENTER FROM
 MAY 1988 THROUGH FEBRUARY 1990

Recyclable Materials	Amount Collected
Aluminum	134,000 pounds
Newspaper	375,000 pounds
Glass Containers	114,000 pounds
Computer paper	37,000 pounds
Car Batteries	1313 counted
Total Recyclables Diverted	340 Tons

Source: City of Owasso, Station Overview, 1990, p.3.

The idea to provide Owasso with a center to take recyclable material originated with councilwoman Pat Marlar (Martin, 1988). After approaching the city with the preliminary plan to recycle, the idea was met with overwhelming support from the other members and Owasso's city manager, Rodney J. Ray. Those in charge of the research for the project began investigating various recycling options which best fit Owasso. By March 15, 1988, the city had selected the drop-off/ buy-back recycling system with a convenience station. The city believed this plan could be implemented effectively, and for the least cost. The recycling and convenience center began operation on May 4, 1988.

TABLE II
COMPARISON OF THE OWASSO REFUSE
DISPOSED BETWEEN 1989 AND 1990

1989--Base Year:	1990--Comparative Year:
3,626 tons Landfilled	3,128 tons Landfilled
201 tons Recycled	304 tons Recycled
	390 tons Yard Waste
3,827 tons Refuse	3,822 tons Refuse

Note: Volume of recyclable materials collected increased. There was an 18.26% reduction in over all refuse from 1989 to 1990. All yard waste was banned from the landfill in 1990.

Source: Knebel, Memorandum to Rodney J. Ray, March 13, 1991, p. 2.

Financial Analyses

When the city of Owasso first proposed a recycling program, the revenue generated from the recycled materials was expected to pay for the program (Ray, 1988). Since 1988, Owasso's city owned and operated recycling center has been financially deficient as measured by a cash-flow analyses. Table III includes an overall summary for the costs of the recycle/convenience center and the revenue collected from the recyclable material from the opening of the program in May 4, 1988 to July 1, 1989. During this period, the city of Owasso subsidized the program at a cost of approximately \$34,661.79.

TABLE III
 CASH-FLOW ANALYSIS OF OWASSO RECYCLING
 AND CONVENIENCE STATION FROM
 MAY 4, 1988 TO JULY 1, 1989

Expenses		Income	
Operational Expenses:		Convenience Station:	
Personnel	\$33,979.70	All materials	\$824.70
Approximate Utilities	\$750.00		
Approximate Fuel	\$85.50		
Recycle Center Expenses:		Recycle Center Income:	
Computer Paper	\$112.09	Aluminum Cans	\$390.29
Glass	\$49.98	Newspaper	\$259.73
Cardboard	\$1,248.39	Car Batteries	\$89.15
Total Expenses	\$36,225.66	Total Income	\$1,563.87

Source: City of Owasso, The Owasso Recycle and Convenience Station
 Fourteen Month Review, 1989, p. 21.

Owasso expected to incorporate the benefits of recycling through the savings of transportation, hauling, and disposal costs experienced by the city. The savings on the cost of transportation and hauling have not been determined by the city of Owasso. However, the city provided a very conservative estimate approximating the savings of disposal site volume as ranging from 40 to 60 cubic yards per month, or \$210 to \$315 in tipping fees per month. Owasso has a contractual agreement to dispose of residential solid waste with a privately owned and operated disposal facility, Quarry Landfill. The costs for the disposal services are paid for by residents, who are billed monthly for use of the services. The charges for the municipal solid waste disposal service are found on the monthly utility bill sent to each resident.

Participants of Owasso's Recycling Center

Interviews of city employees involved in the center, such as city clerk Jane Buchanan (1991) and computer operator Mike Knebel (1991), showed a general consensus that the program does not receive the volume of recyclable materials necessary for the program to "break even" financially. Knebel and Buchanan believe the citizens of Owasso are in favor of the recycling center; however, the costs of operating the program have exceeded the revenues since the center opened. Owasso has monitored and documented the number of participants and the distance they travel to utilize the center. However, the number of residents using the center may be misrepresented because the same participants have been accounted for repeatedly. The city found that the low volume of recyclable materials accumulated at Owasso's recycling center could be a result of distance. Table IV lists the distance travelled by customers from August through October of 1990. The City of Owasso found those who lived within a five mile radius participate most often. If the participants travelled further than the five mile radius, the percentage decreased by more than half. Citizens who must travel 10 miles or more show little interest in participating in the community recycling center.

A Solid Waste Study Directed for the Metropolitan Environmental Trust

In 1991, the city of Owasso was included in a study directed by the Metropolitan Environmental Trust (M.e.t.). The M.e.t. is a public trust, located in the city of Tulsa, having 10 beneficiaries, including 8 municipalities (Bixby, Broken Arrow, Glenpool, Jenks, Owasso, Sand Springs, Sapulpa, and Tulsa) and two counties (Tulsa and Wagoner). To perform the study, the M.e.t. entered into a contract with the environmental consulting firm, CH2M HILL of Tulsa, Oklahoma. The study concluded that Owasso was the only community within the M.e.t. service area with a city wide recycling program. The recycling center may have contributed to the diversion of recyclables (CH2M HILL, 1991).

According to the study, Owasso's loads contained low amounts of newspaper and aluminum. However, the disposal rates were the second highest per capita at 4.3 pounds per day. This rate was significantly higher than the average waste generation of 3.6 pounds per capita per day according to the EPA (1989, p.1).

TABLE IV
DISTANCE TRAVELLED BY CUSTOMERS UTILIZING
THE OWASSO RECYCLING CENTER AUGUST
THROUGH OCTOBER 1990

Recyclable Collected	Under 5 Miles	5 to 10 Miles	10 to 20 Miles	Over 20 Miles
Aluminum	70%	24%	6%	1%
Newspaper	71%	25%	4%	1%
Glass	70%	25%	4%	1%
Comp. Paper	61%	39%	0%	0%
Batteries	63%	35%	2%	0%
Average	66.79%	29.39%	3.21%	.62%

Source: City of Owasso, Chart: Distance Travelled by Customers, August-October 1990.

Statement of the Problem

Owasso leads Oklahoma as the first city owned and operated recycling center. Owasso's recycling program has been used as a model for other communities throughout Oklahoma since it opened in 1988. Today, the center remains underutilized and has failed to reach the economic potential Owasso city leaders originally anticipated. The lack of

environmental education, motivational incentive, and general information about the city's recycling program reduce potential citizen participation and the volume of recyclable materials needed to help sustain program costs. Although the recycling center was designed to make a profit (or at the very least be budget neutral service), a deficit remains at the end of 1991. This study surveyed Owasso citizens to determine the factors inhibiting participation in the local recycling program.

Purpose of the Study

This study investigates the Owasso resident's current knowledge and attitudes related to local recycling efforts and addresses the motivational factors which encourage recycling behavior. Understanding the motivations and barriers to residential recycling is an important ingredient for designing a program to increase participation at the recycling center. Motivational programs which attempt to encourage long-term recycling behaviors within the Owasso community can maximize the efficiency and cost effectiveness of this model recycling program. Comparisons of the Owasso recyclers and nonrecyclers were used to identify probable marketing and advertising strategies for the Owasso Recycling Center (ORC). By understanding what the residents of the community know and understand about environmental issues and the implications of recycling, the city government can design educational and informational programs.

CHAPTER II

REVIEW OF LITERATURE

Introduction

Research evaluating ways to motivate recycling behavior and increase participation within local recycling programs has increased over the last 20 years. During this time, researchers have experimented with a variety of motivational incentives which induce resource conservation behavior. By introducing various extrinsic and/or intrinsic incentives to controlled populations, researchers have observed which recycling programs can achieve a short-term or long-term increase in environmental awareness and an increase in participation of local recycling programs (see Appendix A). In contrast to experimental programs which observe the introduction of a variety of recycling programs to a selected population, other researchers have focused on the characterization of the public's perception and knowledge of recycling, their present awareness of environmental concerns, and their views of how much participating in the altruistic behavior benefits the environment. Information on attitudes and motivations which initiate recycling behavior is gathered through surveys.

Others have targeted nonrecyclers in their research, focusing their attention on ways to produce recycling behavior. Some researchers have investigated differences between recyclers and nonrecyclers, and compared them for a better understanding of motivational factors. If public attitudes and motivations are understood, coordinators of recycling programs can direct and influence their community to achieve a strong, long-term participation in recycling programs.

Incentives Motivate Recycling in Community Programs

Extrinsic Incentives

Two experiments have been conducted to determine what motivates individuals and communities to participate in recycling behavior. In a 1976 study, Witmer and Geller tested monetary rewards and incentives as a factor to induce participation in recycling programs. They used six university dormitories at Radford College in Radford, Virginia to compare motivational incentives, including prompts (see Appendix A). The incentives included a written request asking residents to participate in the recycling program because it is the ecological thing to do, raffles, and a competition between two dormitories. The experiment involved a two week baseline of paper recycling prior to motivational incentives. Following the two week period, the motivational incentives were included in the paper recycling program for a three week period. Flyers were distributed to each room to insure that students were fully aware of the incentives included in their recycling program. A three week follow-up period observed the change in participation as a result of the termination of incentives.

During the experimental phase, the incentives, including raffles and competition, were more successful in motivating paper recycling than the prompting technique. A coupon was given to each resident who delivered a pound of paper to the dormitory collection rooms. The collection rooms were open Monday through Friday, from 5:30 p.m. to 7:30 p.m. During the third week, 10 prizes consisting of coupons were raffled off, with a value of \$3 to \$20 for individuals. Whichever dormitory recycled the most paper within the competition treatment won a cash prize of \$15 for the dormitory.

Witmer and Geller (1976) examined the amount of paper collected by each person and the room number of each resident making deliveries. The amount of paper collected was determined by weight. A comparison of how far residents would travel to participate in the program was analyzed by use of a chi-square analysis. The two data collections identified

the maximum frequency of participation by comparing the baseline, incentives or prompts, and the follow-up period. For the most part, the majority of students who participated in the recycling program lived on the first floor. Witmer and Geller suggested that a lack of convenience for residents, other than those on the first floor, could be a reason for the low participation rates.

Witmer and Geller (1976) found participation in the follow-up period declined to the base level when incentives were no longer provided. They concluded by explaining that individuals should be rewarded for their good "ecology-improving behavior" if they are going to participate in community resource conservation programs. Witmer and Geller saw extrinsic incentives as the most effective way to motivate recycling participation in local recycling programs.

In 1982-83, extrinsic motivations were scrutinized by Jacobs and Bailey in Tallahassee, Florida. Disagreeing with monetary incentives as a means to motivate recycling behavior in the public, they regarded extrinsic motivations (such as lotteries, prizes, or payments for recyclable materials), as uneconomical and having only a short-term success (participation only occurs during the life span of the monetary incentives). They included a total of 615 homes in their experiment. Prompting, payment for materials, lotteries, and increasing frequency of collection were the treatments used to increase participation. Although the results did reveal a short-term increase in recycling participation, none of the treatments was cost effective.

The changes in participation of each group during the baseline and the treatment conditions were determined by use of chi-square analysis. During the intervention phase, the most successful incentive to increasing newspaper recycling participation was the lottery treatment. The lottery included the information pertaining to the recycling program procedures and a chance to win a prize each time the resident participated in the recycling program.

The other three treatments were relatively close in participation effectiveness. Prompting included informing the residents of the newspaper recycling program and distributing flyers to the residents five to seven days before the pick-up service arrived to collect the newspapers. Prompting followed lottery treatment as the second most effective recycling incentive. Next most effective treatment was the weekly pick-up of newspapers for recycling and the penny-a-pound approach. Both of these treatments included the prompting treatment, as well as each of their own added incentives. All treatments, other than the weekly pick-up, fell within a bi-weekly collection service. A weekly collection of newspapers was provided to determine if an increase in frequency of collection would increase participation. The penny-a-pound treatment enabled residents to receive a penny for every pound they contributed to the program.

Jacobs and Bailey (1982) agreed that, due to the insignificant differences between the last three treatments, the increase in frequency collection and penny-a-pound treatments could be excluded from the program. Most residents contribute the same amount of paper, whether the collection is weekly, or bi-weekly. Collectors also found many do not participate weekly, even when the service is provided on a weekly basis. The authors also noted participants receiving a penny-a-pound did not find the monetary value worth accepting. Many residents admitted they were willing to participate in the program without the penny-a-pound incentive.

Though the study was able to examine motivational incentives on a short-term basis, Jacobs and Bailey (1982) noted the experiment among residents of a university community revealed no long-term benefits from these incentives. In the experiment by Witmer and Geller (1976) using college students, a follow-up period determined treatments would fall back to the baseline when incentives were taken away. The cost-benefits analysis performed by Jacobs and Bailey (1982) revealed the treatments performed in the study were not cost-effective. The authors also suggested variances to the experiment could enhance the cost-effectiveness of the program.

Intrinsic Incentives

In a recent study conducted by Hopper and Nielsen (1991), various methods of introducing a recycling program were studied and compared in Denver neighborhoods. They observed the change in behavior and attitude by those influenced by the motivational incentives introduced in these programs. More specifically, Hopper and Nielsen were interested in the extent to which "Recycling could be conceptualized as altruistic behavior, or behavior influenced by social norms, personal norms, and awareness consequences." (p.195) Five groups were established with different levels of information being provided for the experiment:

1. The first group consisted of 40 households, or 4 blocks. The researchers observed the affect block leadership had on the attitude and behavior established prior to the study.
2. The second group, consisting of 60 households, or 6 blocks, was introduced for the first time to block leaders, those who inform the households about the recycling programs.
3. The third group consisting of 5 blocks, or 50 households, received information brochures and monthly prompts delivered by the experimenters.
4. The fourth group, consisting of 50 households, received information brochures just prior to the experiment, and again halfway through the experiment.
5. The fifth group, the control group, consisted of 40 households and received no experimental intervention.

The changes in attitudes were evaluated through use of a questionnaire. Prior to the experiment, one person from each household was asked to complete a questionnaire. This was repeated at the end of the intervention period. The questionnaire included scales revealing changes in recycling attitudes. The attitude scale included questions related to social norms, personal norms, and awareness consequences. Social norms were measured by the expectancy of friends and neighbors to recycle. Personal norms measured the

feelings individuals felt when they threw away recyclable materials or if they felt an obligation to recycle the materials. Awareness of consequences was measured by asking individuals various reasons why recycling was important. ANOVA, an analysis of variance, was used to analyze the difference between the various variables measuring attitudes within each individual group, the relationships between the five groups, and the difference between the pre-test and post-test of each of the five groups.

During the seven month experiment, behavior change was measured according to frequency of participation using a scale from 0-7. At the end of each month, drivers picking up the recyclable material would tally each household participating in the recycling program. If a household participated every month during the intervention period of seven months, then the score would total seven. ANCOVA was used to analyze the difference between the recycling scores of each of the five groups during the intervention period and the follow-up period.

The results of this experimental study indicated the use of block leaders as a motivational factor can substantially increase recycling behavior. When evaluating the questionnaires, the second group experienced a substantial increase in social and personal norms as reasons to recycle. Though prompting and information brochures play a role in increasing recycling activity, block leadership was the primary influence in "shaping of norms" crucial to establishing recycling behavior (Hopper and Nielsen, 1991, p.215).

One exception to the improvements which occurred in intrinsic behavior as a result of block leadership, was the lack of influence related to awareness consequences. According to Hopper and Nielsen (1991), it is necessary for awareness consequences to be influenced and improved if attitudes are to be completely modified. This study demonstrated recycling behaviors were influenced by motivational factors exposed to the households, but attitudes remained unaltered. Hopper and Nielsen suggested that block leaders should explain the consequences of recycling, or not recycling, as a means of enhancing people's attitudes towards recycling.

Use of Both Extrinsic and Intrinsic Incentives

Katzev and Pardini (1987) examined the use of commitment (pledge) and the use of extrinsic as well as intrinsic incentives as a way of encouraging recycling behavior. During the experiment, a follow up period aided in identifying the best long-term incentives used to enhance recycling behavior in a community.

For the purpose of this experiment, a newspaper recycling program was created to observe the change in behavior. Residents of a homogeneous neighborhood in Portland, Oregon were asked to participate in the program, had the collection process explained, and were asked to filled out a short questionnaire. Residents within each household were asked one of the following:

1. to merely participate in the newspaper recycling program (the control group),
2. to participate in the program by signing a pledge to commit,
3. to participate in the recycling program in exchange for token incentives, or
4. to participate in the program by signing a pledge to commit with token incentives given for a period of five weeks.

A follow-up experiment lasted three weeks after the commitment or token incentives ceased. At the end of the follow-up period, the participants were asked to fill out another questionnaire and return it in an enclosed, stamped, self-addressed envelope.

Both questionnaires were similar in format. Katzev and Pardini (1987) discovered residents' attitudes concerning conservation activities, including recycling newspaper, were positive in both questionnaires. The second questionnaire did ask two other questions which were not included in the first questionnaire. One of the questions inquired whether or not the residents were gone during the experiment, and the other inquired to what extent the members of the household knew about the recycling program. The additional questions determined almost every household was occupied during the experiment and that most members of the households knew about the newspaper recycling program.

The frequency of participation during the intervention period was analyzed by use of an omnibus chi-square analysis. According to the analysis, all treatments were found to differ substantially from the control group. The chi-square analysis found no significant difference between the groups. Several planned pair-wise comparisons were made between the groups. Though the chi-square analysis did not find substantial variances between the groups, the planned pair-wise comparison showed that commitment by signing a pledge and the combination of the commitment by pledge and token incentives had the strongest difference from the control group. But among the groups, excluding the control group, there remained no significant difference. Data were also collected from weighing the newspapers collected from each household. A series of planned pair-wise comparisons found the weight of the newspapers collected to be consistent with frequency of participation.

During the follow-up period, the commitment treatment and the combination commitment and token incentive were found to have recycled more often than the control group. The token incentive treatment alone fell below the frequency of the control group. Again, chi-square analysis was used to determine the frequency of participation differences between the treatments. Katzev and Pardini (1987) found the combination of commitment and token incentives to be the only group to have differed significantly from the control group. The results of the weight of recycled newspaper were similar to the analysis of frequency of participation during the follow-up period. Neither the chi-square analysis nor the planned pair-wise analysis found a significant difference between the groups other than the control group (Katzev and Pardini, 1987). This verifies the concept that providing motivational incentives can increase recycling behavior in individuals. If long-term participation is the goal of any community recycling program, the introduction of a combination of incentives, with intrinsic incentives as the main ingredient, can be the best solution for increasing recycling behavior.

In a more recent study conducted by Wang and Katzev (1990), two experiments conducted in Portland, Oregon were used to analyze motivational factors. Follow-up periods were conducted as a measurement of determining long-term success in increasing recycling participation in local recycling.

The first experiment studied the impact of group commitment by signing a group pledge. The group consisted of 24 individuals living in a retirement home. Each individual was asked to sign a group pledge to recycle paper for four weeks. Prior to group pledging, Wang and Katzev (1990) sent flyers to the retirement home describing the paper recycling program, the types of paper recycled, and the locations of the containers for the paper. After asking to commit by signing the group pledge, the rate of recycling increased 47 percent. Recycling continued at a level of 47 percent four weeks after the group commitment ended.

An ABA design was used to implement the experiment. An omnibus F-test examined the differences between the three phases of the experiment, including the pre-group commitment to recycle, the extent of the four week pledge to recycle, and post-group commitment to recycle. Data from the follow-up visit maintained much higher levels than those previous to the intervention of group commitment (Wang and Katzev, 1990).

In the second experiment, a college dormitory was used to compare group commitment, individual commitment, and use of extrinsic incentives to motivate recycling behavior. The experiment included 87 students residing in 47 dormitory rooms. Each group, including group commitment, individual commitment, use of extrinsic incentives, and the control group, knew nothing about the purpose of this experiment other than to recycle paper. The residents were randomly selected, and all were chosen far enough apart to insure that the residents did not know of the different variations of the experiment. The experiment lasted four weeks, with a follow-up period of three weeks after the commitment expired, or the incentives were no longer available.

Group commitment began with a five-minute speech discussing the recycling program. After the speech, the group was given time to discuss whether or not to participate. Once agreed, each participant was asked to sign a pledge committing to group recycling for 4 weeks. Each of the 10 rooms participating were given a plastic bag and a flyer describing when and where to place their bag of paper to be recycled each week. A new bag would be given to replace those collected.

Individual commitment was also tested. Individual residents were approached and asked to participate in the recycling program. Those who chose to participate signed a pledge of individual commitment lasting four weeks. They were given a bag for the paper to be recycled and a flyer explaining when and where to place the bag at the end of each week for pick up and replacement. A total of 14 rooms were individually committed to the recycling program by signing the pledge.

Another experimental group included those who recycled for coupons from local businesses. Individuals were explained the specifics of the program and were told that if at least 50% of those within their hall recycled paper, all those within the hall would be given coupons. If those who recycled were less than 50%, no one would receive coupons. Flyers containing information about the recycling program and bags for the paper were given to the individuals residing in a total of 12 rooms.

A control group, consisting of 11 rooms, was also examined. Individuals considered in the control group were given flyers and a bag for the paper. The students were told when and where to place their bag of paper and were told a replacement would be provided in its place.

All students were notified of termination of their commitment, whether it involved pledging, by either group or individual, coupon incentives, or neither. Recycling of paper and distribution of bags remained a weekly activity after the first four weeks, but the students were under no obligation or incentive to continue to participate in the program. After the four-week phase, the program continued to pick up paper for those who

continued to participate in the program. At the end of three weeks, students were notified that the program had been discontinued and were thanked for their effort.

Wang and Katzev (1990) accounted for the frequency and weight of the paper collected from each room within each group, and the two phases of the experiment were compared. The first four weeks' frequency of participation was analyzed by use of an omnibus chi-square analysis. A series of planned pair-wise comparisons showed all three groups differed significantly from the control group (Wang and Katzev, 1990). Individual commitment maintained the strongest participation level and the control group showed the lowest participation level. The incentive group maintained the second highest participation level, and the group commitment followed as having the third highest participation level.

The weight of the paper within the intervention phase was calculated by use of ANOVA analysis. An omnibus chi-square analysis of these data revealed a variation in the collection of paper from all three groups. The largest difference occurred between the individual commitment, holding the highest amount of paper collected, and the control group, maintaining the lowest amount of paper collected. Group commitment and incentive motives preceded individual commitment in that order (Wang and Katzev, 1990).

After the intervention phase, Wang and Katzev (1990) found a decrease in participation of both frequency and weight of paper collected within three of the groups. The control group maintained the same relatively low recycling rate during the three week follow-up phase as it had in the intervention phase. Though the three groups decreased in frequency of participation, according to a chi-square analysis, they still maintained a higher percentage than the control group. The individual commitment group maintained the highest rate of participation during the follow up phase. As for the amount of paper collected, the individual commitment group was the most effective with a weight of five times that collected from the control group (Wang and Katzev, 1990).

Inducing Recycling Behavior in Nonrecyclers

A study conducted in the late 1970s assessed a variety of techniques used to induce recycling behavior (Arbuthnot, et. al, 1976). Subjects for the experiment consisted of 291 households randomly chosen in rural Athens, Ohio. The experiment conditions consisted of (Arbuthnot et al., 1976):

1. a three-step group (survey, appeal, and letter),
2. a series of two-step groups (survey/appeal or appeal/letter),or
3. a series of one-step groups (survey only, appeal only, or letter only).

Data collected through surveys assessed knowledge of local and national issues concerning recycling and determined who was already recycling. Since the purpose of the study was to induce recycling behavior, those residents who recycled were excluded from the experiment. After completion of the survey, subjects who did not recycle were asked to participate in a week long recycling of aluminum cans (the appeal). Each household received a bag for containment and storage of the cans, and were told the bags would be picked up in a week. Accompanying each bag was a flyer containing helpful recycling tips (Arbuthnot et al., 1976).

One week after the collection of cans, a letter concerning the need for a community-wide recycling program was sent to all households involved in the experiment. A request to contact their city council representative to indicate support of an expanded recycling program was included in the letter (Arbuthnot et al., 1976).

By using a telephone survey, the residents were asked the number of activities they participated in, including the recycling center. By discovering if participation had increased during this period, Arbuthnot et al. (1976) determined whether the behavior techniques used in the experiment had any influence on participation in the center. The first telephone survey occurred one to two months after the letters were mailed. The second survey occurred 18 months after the experimental intervention. The survey was conducted under two different identities, separate from that of the survey, appeal, and letter techniques.

The hierarchical analysis on effectiveness were performed on each treatment. The relationship between the treatments were compared using a series of chi-square analyses. Analysis of the survey conducted one to two months after the experiment showed the combination of the three treatments (the survey, appeal, and letter) and the combination of the appeal and the letter had the most profound impact on increasing recycling behavior. The two-step combination of survey/appeal and survey/letter were runners up in effectiveness to enhance recycling rates. Eighteen months after the experiment, the same pattern was present. Arbuthnot et al. (1976) explained, "Nearly all participants who were initially induced to begin recycling were continuing to do so a year and a half later" (p.363).

Another study conducted by Burn and Oskamp (1986) used public persuasion and public commitment in an experiment to induce recycling behavior in nonrecycling households. Nonrecyclers were identified as those households which had not recycled six weeks prior to the study. Out of a total of 201 homes in Claremont, California, each home ultimately received one of the following treatments:

1. persuasive communication consisting of a brief informative statement and a written appeal that residents were asked to read,
2. public commitment consisting of an oral explanation, a pledge card to be signed by an adult member of the household, and a recycling sticker, or
3. a combination of both persuasive communication and public commitment (Burn and Oskamp, 1986, p.32).

Trained Boy Scouts introduced the various treatments. Each Boy Scout had one treatment and would travel door-to-door distributing the treatment to a particular group of homes in a neighborhood. The control group, consisting of 132 households, received no treatment.

By using the Posteriori Tukey HSD test, Burn and Oskamp (1986) discovered all three treatments differed significantly from the control group, but the treatments themselves

revealed little variation. "An analysis of variance was conducted to compare the three treatment groups and control groups in the number of weeks each household recycled" (Burn and Oskamp, 1986, p.35). Burn and Oskamp were encouraged by the difference the first three treatments had on the households. The results concluded that intrinsic motivational factors, like those used in this study, can change attitudes of those nonrecyclers and substantially increase the recycling participation in community programs.

Satisfaction Received From Conservation Resources

During the late 1970s and early 1980s, DeYoung (1986) performed studies related to the recycling program of Ann Arbor, Michigan. DeYoung sought to understand why citizens recycle through observing the satisfaction people receive from conserving resources. One of the studies examined the satisfaction people receive from performing conservation activities prior to the expansion of a curbside service. By using a mail-back questionnaire, DeYoung obtained information related to satisfaction and conservation activities from at least 107 respondents. The questionnaire rated satisfaction derived from performing various activities ranging from waste reduction, recycling and reusing, to participating in a conservation activities, and purchasing of second-hand goods.

Data analysis included a factor analysis program and a hierarchical cluster analysis to establish categories of satisfaction and behavior. An analysis of variance (ANOVA) was used to establish if a relationship existed between the behavior scales and the satisfaction scales. Student t-tests were used to distinguish if significant differences existed between any two categories.

The satisfaction DeYoung observed from various behaviors was categorized by "avoidance of wasteful practices, participation in community activities that can make a long term difference, or enjoying the material benefits and luxuries." (1986, p.446) Observations from the survey concluded that people may carry out conservation activities not just for extrinsic incentives, but for self-satisfaction.

After the expansion of the curbside program, DeYoung (1985) examined all areas receiving curbside services and a drop-off recycling station on the west side of the city of Ann Arbor, Michigan. He sought to identify what motivational incentives would persuade people to incorporate conservation activities as part of their daily routine. Using a questionnaire, DeYoung sought to identify the changes in behavior, satisfaction, and motivation people experience when performing conservation activities. Each activity was individually analyzed, compared and the relationships between them were examined.

The survey was composed of various conservation activities categorized into one of the three categories, including behavior, satisfaction, and motivation. Data analysis was similar to the previous survey. Dimensional analysis was used to stabilize scales used for rating each of the activities from one to five within each category. "Scales were identified using both a numeric factor analysis program and a hierarchical cluster analysis." (1985, p.285) Internal consistency was measured by observing the coherence of the scales. Data were collected from a total of 263 questionnaires: 188 were returned through mail-back and 75 were completed at the drop-off recycling station.

Results of the data related to motivation factors revealed a positive relationship between intrinsic motivation and conservation behavior such as recycling and reuse. There was also a positive relationship between intrinsic motivation and satisfaction of frugality and participation. A correlation was found between behavior and satisfaction. When people participated in a conservation activity, personal satisfaction was derived from the activity. DeYoung (1985) suggested "Ecologically responsible behavior might be encouraged by helping people to discover that there are intrinsic payoffs associated with such activities" (p.289).

In 1991, DeYoung conducted an additional survey, including six individual recycling educational programs funded under the Clean Michigan Fund. Information obtained from the surveys were collected by both telephone and mail-back questionnaires. DeYoung sampled people's attitudes towards recycling, whether they associated recycling habits with

conserving natural resources, their future plans to recycle, and if they believed they were recyclers. The survey further analyzed the motivations and barriers to recycling, why people recycle, and attained an idea of what is currently being recycled. After analysis of the surveys, DeYoung concluded the population surveyed within the state of Michigan was generally pro-recycling; they intended to recycle more in the future, and they were most influenced by intrinsic motives.

A Comparison of Recyclers and Nonrecyclers

Vining and Ebreo (1990), compared the knowledge, motives, and demographics between recyclers and nonrecyclers. The information necessary for the study was obtained through questionnaires sent out to 500 randomly selected households in Champaign-Urbana, Illinois. Participants included both recyclers (anyone who recycled material in the last year) and nonrecyclers (those who have not recycled material in the last year). The number of those who responded included 87 nonrecyclers and 110 recyclers.

Data retrieved from the questionnaires, which used a five point scale for answers, was prepared by Vining and Ebreo (1990). Data analysis found that recyclers were more knowledgeable about recycling than were nonrecyclers. Recyclers were more familiar with information pertaining to recycling, recycling programs available in their community, and materials which could and could not be recycled within their community. The recyclers had also heard about recycling from more sources than nonrecyclers. A student t-test was performed to determine if there was a significant difference between the overall number of sources reported by recyclers and those reported by nonrecyclers. Recyclers knew more about available recycling programs, including buy-back, drop-off, private hauler, fundraiser, business collection, school collection, and curbside collection.

Using chi-square analyses, Vining and Ebreo (1990) found the most popular media for recyclers to have heard about recycling was through the radio and by association with

friends. They also found newspapers, television, posters, mailing and newsletters, school programs and associations with co-workers were equally as informative to both groups.

Vining and Ebreo (1990) identified what motivated recyclers and nonrecyclers. In the questionnaire, both recyclers and nonrecyclers listed environmental concerns as the most important reason to recycle. If nonrecyclers and recyclers realize the environment could be damaged and their own lifestyle could be threatened by not recycling, both parties might be more inclined to participate in recycling activities. Vining and Ebreo (1990) believed social influence is a powerful motivator in settings where recycling behavior is more often observed by one's peers, as in a curbside program. In their questionnaire, the social influence category scored low, revealing the respondents were not influenced by others' opinions (Vining and Ebreo, 1990). But the idea of pressuring family members, neighbors, and community members to do their part to preserve the environment for the future is usually a strong motivator.

Nonrecyclers see monetary value and convenience as a greater motivator than recyclers. Nonrecyclers rated the nuisance and household inconveniences as another reason not to recycle. Programs which do not provide convenient recycling need an educational program to tell nonrecyclers of the long-term hazards of not recycling. Short-term incentives are temporarily beneficial, but long-term motivations for conservation behavior are the key to designing recycling programs. Demographics are useful when marketing the recycling program and establishing differences between those who recycle and those who did not recycle. The mean age was older for recyclers than expected. Those with higher incomes heard of recycling programs through the newspaper, while those with lower incomes heard of programs through television. Those with middle and lower incomes heard of recycling programs from public schools.

Vining and Ebreo (1990) concluded that differences existed between recyclers and nonrecyclers when factors of knowledge related to recycling, motivational factors, and demographic characteristics were analyzed. Recyclers were far more accurate, more

familiar with local programs and sources of information than were nonrecyclers. Nonrecyclers were less secure about what was recycled. Therefore, remedies indicate a need for increased educational awareness of nonrecyclers.

Telephone Surveys

One of the many ways researchers have gathered recycling information is through the use of telephone surveys. Frey (1989) suggested that, although the quality of telephone surveys have increased, the frequency of telephone surveying as well as the invasion of telephone sales have increased as well. This makes the public all the more irritated and less likely to participate in a telephone survey. Other barriers to telephone surveys include wrong numbers, disconnected numbers, busy signals, no answers, call back appointments, and answering machines. No answers, busy signals, answering machines, and inconvenient times can be corrected by calling back at another time. The number of times a single number is called back varied in previous studies. In an attempt to gather as many samples as desired, call backs for unsuccessful connections averaged two to three tries. Frey indicated that the call back appointments rarely are successful, but in an attempt to maintain the sampling total, an attempt should be made.

Summary

There have been a variety of motivational incentives used to promote recycling participation in community recycling programs. Jacobs and Bailey's (1982) experiment on extrinsic incentives as a motivator for recycling behavior found it was uneconomical to provide such devices as lotteries, coupons, or any monetary incentives to promote a long-term recycling program. Witmer and Geller (1976), who observed college students, insist that rewards and monetary incentives must be given to those who perform recycling activities. The use of extrinsic incentives provides only short-term motivation, and participants cease recycling when the extrinsic incentives are terminated.

Katzev and Pardini (1987) and Wang and Katzev (1990) were able to provide a variety of intrinsic and extrinsic incentives to motivate recycling behavior. Their studies showed a clear increase in individual commitment and group commitment over any of the other treatments within their experiments. Extrinsic motivational incentives were only a temporary means of motivating recycling behavior, ending shortly after the incentive was taken away. This was clarified in the study conducted by Katzev and Pardini, when the follow-up investigation revealed the participation by extrinsic incentives was less than the control group or baseline group. Though the token incentive, combined with a commitment by signing a pledge, did increase the participation during the intervention and follow-up period of Katzev and Pardini's experiment, it is clear that the token incentive alone cannot be successful in maintaining recycling behavior after the incentives have been terminated. Wang and Katzev suggested that "The ability of commitment to sustain behavior beyond the intervention period is probably the most significant feature of this technique, especially when contrasted with the limited success of incentive-based programs in maintaining behavior " (p.273).

Those such as Hopper and Nielsen (1991) conducted an experiment using a variety of intrinsic motivators to encourage participation in a recycling program. By using intrinsic incentives, they determined that changes in behaviors and attitudes could induce recycling behavior. Overall, block leaders served as the most successful means of increasing recycling participation.

Other research, such as Arbuthnot et. al (1976) and Burn and Oskamp (1986), focused their attention on nonrecyclers. In both experiments, intrinsic incentives were used to encourage recycling behavior on a long-term basis. By changing the nonrecyclers' attitudes about recycling, Burns and Oskamp found the longest success rate in recycling participation. Vining and Ebreo (1990) conducted a study to understand and identify the differences between recyclers and nonrecyclers.

Finally, DeYoung's studies took a different approach by characterizing the attitudes and behavior of specific communities, and by identifying what motivational factors would most likely increase conservation behavior. In his study in 1985-86, DeYoung sought to identify the satisfaction individuals receive from performing recycling activities. In his research, DeYoung found resource conservation and our environment to be the most effective motivators for performing recycling activities. DeYoung's study in 1991 looked further to examine specific details for identifying the attitudes, perceptions, and the beliefs individuals have towards recycling. This information is very important to understanding the success of a program and is necessary in the improvement of a community recycling program.

Differences exist between the research found in the literature review and the Owasso analysis. Prior studies consisted of select groups of people. For example, in the studies by Witmer and Geller (1976) and Wang and Katzev (1990), research sampling consisted of only those who live in university dormitories or retirement homes. All the studies were conducted in college towns or metropolitan cities. Radford, Virginia, Tallahassee, Florida, Athens, Ohio, Claremont, California, Ann Arbor, Michigan, and Champaign- Urbana, Illinois are all defined as college towns. Denver, Colorado and Portland, Oregon are known to be progressive, environmentally conscience metropolitan cities. Culturally, geographically, and demographically, there are no similarities between these cities and the rural, suburban city of Owasso. Except for a study conducted by DeYoung (1985), all research discussed in the literature review relates to curbside programs, not drop-off/buy-back recycling centers like that of Owasso. The majority of the research in the literature review is experimental. The Owasso analysis was patterned after observational studies by DeYoung (1991) and Vining and Ebreo (1990). The majority of research found intrinsic incentives to be the best motivation for both recyclers and nonrecyclers. It is the hypothesis of the researcher that the results of the Owasso analysis find intrinsic incentives to be the best motivation to recycling.

CHAPTER III

METHODS

Introduction

Research indicates that an increase in the level of participation through intrinsic motivations could benefit a recycling program. By enhancing the recycling behavior of Owasso residents, the underutilization and the high operational costs of the Owasso Recycling Center (ORC) could be remedied. Over the years, many researchers have discovered a variety of methods to induce recycling behavior and motivational incentives to increase recycling participation. Some researchers have taken an experimental approach, identifying the best method(s) of inducing long-term recycling behavior. Others have assessed the knowledge of recycling to determine the best approaches needed to increase recycling participation. This study sought to collect and analyze current knowledge, attitudes, perceptions, motivations, and barriers perceived by Owasso residents to affect participation in recycling. A questionnaire structured in the pattern established by DeYoung (1991) was used for the data collection. This determination aided in outlining a plan for motivational programs to be implemented for a long-term increase in recycling participation at the ORC. By increasing the rate of participation in the Recycling Center, the program may become less of a financial burden to the community of Owasso.

Population

Many of the Owasso households outside the city limits were included in this study because they represented a significant portion of the Owasso community. The people identified themselves as "Owasso residents." By using only those included in the city

limits, two-thirds of those residents who occupied and influenced the Owasso community were disregarded. Therefore, it seemed necessary to attempt to include all those considered to be Owasso residents.

According to Knebel (1991), the computer operator for the city of Owasso, the population of Owasso residents living outside of the city limits is difficult to determine accurately because the census information was only collected on those within the city limits. The city of Owasso has estimated the population to be 30,000, with approximately 11,000 living within the city limits and the remainder of the population, close to 20,000, living around the perimeter of the city limits. In contrast, an interview with executive director Roger Miner of the Metropolitan Environmental Trust concluded 23,500 was the total population for Owasso (1992).

The Owasso listing in the March 1992-93 Southwestern Bell Green Country Region provides the most representative population of Owasso residents, whether they live in or out of city limits. Previously, a county boundary had divided communications within Owasso, making some "local" calls long-distance. Southwestern Bell united their system allowing a representative sample to be surveyed from the Owasso section of this telephone book. Only those names which appeared to be residential households were included.

The use of the telephone directory did not include those persons with unlisted numbers or new residents missed the publishing cut off date. Except for a small population which consider themselves Owasso residents, but have Collinsville telephone numbers, the numbers listed in the telephone book represents the community of Owasso. Those persons with Collinsville telephone numbers were not included in the study.

Sample

The telephone survey was conducted over two months during June and July of 1992. To achieve a plus or minus error margin of 5%, with a population between 20,000 and 30,000, a sample size of 394 was chosen (Yamane, 1967). A pilot study of 20 telephone

calls resulted in a 50% response rate with 10 respondents being interviewed. Eight hundred names were then drawn from the Owasso section of the March 1992-93 Southwestern Bell Green Country Region using systematic sampling techniques. The approximate number of Owasso households and/or businesses who have telephones was 6,400. The telephone book contained 21 pages. Eight-hundred numbers were needed for the sample. By dividing 800 by 21, a statistically random number of 14 was derived. Slips numbered from 1 to 14 were then placed in a box and slip number 12 was drawn, providing some element of randomness. On each page, household numbers 12, 24, 36, 48, 60, 72, 84, 96, etc. were selected and were included in the list of telephone numbers called.

Instruments

The method used to collect the recycling data on Owasso residents was a telephone survey. The questionnaire used to measure recycling knowledge and behavior for this survey is shown in Appendix B.

Interview Procedure

After the interviewer identified himself or herself, a statement followed informing each person interviewed that the call was a recycling survey for Oklahoma State University and the city of Owasso. Originally, the university name was mentioned first, in anticipation that people would be more receptive to research from a university than city government. After completing a pilot study of 20 households, introducing the city of Owasso before the university provided a more welcome response. By indicating that the survey was for a local cause, the response rate and the participation of the survey increased. Originally, the importance of participation in the pilot survey was emphasized to attract more cooperation, but due to the wordiness and the need for a shorter introduction, the statement was dropped. Surprisingly, Owasso citizens seemed willing to participate,

whether a statement involving no sales and no money was indicated in the introduction or not. The introduction statement ended by asking each person if they would answer some general questions about recycling. If the answer was yes, the individual usually completed the survey lasting no more than 10 minutes.

Two questions were asked before beginning the questionnaire. In some cases, children answered the telephone. In an effort to obtain accuracy, surveying an adult was desired. The first question aided in identifying an adult in the household for the purpose of this survey (Appendix B). This is not to assume the children of the household know any less about recycling within their surroundings, but it is an assumption that the adult participates in the separation, collection, and eventual transportation of the recyclables. It is also necessary to gather the most accurate data, and some of the demographic questions were easier for an adult to answer. While the survey actually took place, many times it was difficult to detect an adult or parent from a teenager. When the age was unclear, the survey proceeded. In the last section of the survey, the year of birth was established, and the education question was adjusted to include those still in high school.

The second question asked each respondent was whether or not they were, or consider themselves to be, residents of Owasso (Appendix B). This question determined whether or not the survey would continue. If the question was answered no, the interview was terminated and the interviewer thanked the individual for their time. If the question was followed by a yes, then the questions continued.

The first three questions of the questionnaire identified the respondent as a recycler or nonrecycler, identified their recycling frequency, and any probable future changes in their recycling behavior (Appendix B). The first question was to identify whether the respondent was a recycler or nonrecycler indirectly. For the purpose of this survey, anyone who had recycled any glass, aluminum, newspaper, magazines, plastic, office paper, cardboard, steel cans, used motor oil, or batteries in the last year was designated a recycler.

The second question examined the frequency of recycling from those who recycled by asking each respondent to estimate how often they separate their recyclables from their trash. The purpose of the question was to measure how often people made a conscious effort to divert waste from their trash to be recycled.

The third question examined future intentions to recycle. The future intentions of the respondents indicated the percentage of Owasso citizens who may increase their recycling efforts. This could be useful if Owasso modifies the recycling program to increase citizen participation. DeYoung (1991) estimated that recycling is becoming a behavioral norm, and people may be apt to answer as increasing their recycling efforts, whether they actually do so or not.

Questions four and five of the questionnaire were taken almost directly from DeYoung's (1991) survey (Appendix B). Below each question was a number of statements which were read to each interviewee. The statements included: "I recycle to conserve natural resources", "I recycle to support charity", "I recycle to earn money", "I recycle because it seems like the right thing to do", and "I recycle to preserve the environment". The interviewer told each respondent that a number of statements were going to be read which could include reasons why they may (or would) recycle. This was followed with an explanation of how the participant was to answer each of the statements. The scale was a Likert five-point scale in which each participant answered either, "I strongly agree", "I agree", "I disagree", "I strongly disagree", or "none of the above". Each participant was asked which of the statements applied to them.

The statements below question four were related to why people may or may not recycle. The purpose was to analyze what motivational incentives induce recycling behavior. The motivational factors were identified by most popular and least popular reasons why each respondent recycles.

Just as important as the motivational factors was the need to identify the barriers which keep the public from recycling. Question five collected data concerning the barriers

which may keep individuals from recycling. Within this question there were eight statements (See Appendix B). Except for rewording some statements, question five came directly from DeYoung's 1991 survey which ranked each of the respondent's reasons for recycling discouragement.

The next phase of the questionnaire investigated what each citizen knew about recycling within their own community, and more specific, what they knew about the ORC. Question six asked if the respondent had ever heard of the ORC (Appendix B). If the respondent had never heard of the Center, questions 7 through 10 were deleted, and the interviewer was directed to question 11.

If the respondent had heard of the ORC, a series of question were asked relating to the knowledge about the center. Taken from DeYoung's (1991) questionnaire, question seven listed a number of sources from which the respondents may have gained information (Appendix B). The interviewer asked the respondents whether or not they have heard about the Center from any of the following sources, including newspapers, mailings, friends, school, radio, television, work, and/or posters. The respondent answered either yes or no to each source read. By documenting the sources of information, the city could determine the best and worst means for informing the public. Prior to this survey, citizens who lived within Owasso's "city limits" had received a flyer or mailing in their utility bill. New residents were mailed information about the recycling center. Other than these mailings and the local newspaper, no other public information had been distributed. Questions eight and nine (Appendix B) were direct questions. Question eight accounted for those who knew where the ORC is located, and question nine asked if the respondent had ever taken recyclables to the center.

Question 10 sought to identify what materials the citizens of Owasso believed were currently recycled at the center (Appendix B). A list of possible recyclables were read to each respondent, and the interviewer asked them to reply by stating "yes", "no" or "not sure" for each material, including glass containers, other (plate) glass, newspapers,

cardboard, magazines, office paper, aluminum cans, other aluminum (such as foil), rubber tires, steel (tin)cans, plastic, batteries, used motor oil, and used antifreeze. The items listed on question 10 were derived from a variety of sources, including: a study by DeYoung (1991), a study conducted by CH2M HILL for the Metropolitan Environmental Trust (1991), and suggestions made by Knebel (1991), computer operator for the city of Owasso.

The final questions (Appendix B) in the survey included demographic question from the respondents. The objectives for collecting demographic information was to characterize the sample of Owasso residents. By collecting this data, particular groups, such as recyclers and nonrecyclers, could be targeted for motivational incentive programs. Questions 11 and 12 asked simple questions about the respondent's gender and age (by asking the year of their birth). The number of people living in their households identified whether large or small households recycle more (question 13).

Question 14 identified if the respondent lived in or outside the Owasso city limits. If the city picked up the respondent's trash, they were living within the city limits. Those who answered "I'm not sure" or "myself" made it impossible to determine their location.

Question 15 verified where respondents lived by asking them to estimate how far they live from the Owasso City Hall. Because the recycling center is located only a few blocks southwest of the City Hall, a neutral government building was chosen as the central location for this question. If people were unfamiliar with the location of the Owasso City Hall, McDonalds was used as the next alternative for a central location. McDonalds is located less than a block east of City Hall.

Questions 16 and 17 were sensitive questions which collected data concerning education and the income of those interviewed. The respondent was simply asked to stop the interviewer when the highest level of education they completed was read (see Appendix B). A respondent's educational background and income provided additional data for targeting advertising. The questionnaire on income asked each individual if they would

stop the interviewer when the category which fit their 1991 family income level was stated. This was to coincide with question 16, and aided in characterizing the sample of Owasso residents.

Procedures

The questionnaire, administered by telephone, was given to randomly selected residents of the Owasso area during the months of June and July of 1992 (Appendix B). The survey was conducted from telephones in the office of the Metropolitan Environmental Trust (M.e.t.), located in downtown Tulsa at 201 West 5th Street, Suite 600, Tulsa, Oklahoma. The M.e.t.'s Executive Director, Roger Miner, donated the office for evenings and weekends for the Owasso telephone survey.

Volunteers, contract assistants, and the researcher used the M.e.t. telephones week days after 5:00 p.m. and on weekends. The majority of calls were made after working hours and on weekends. Telephone calls made during normal working hours were made from the researcher's home.

Objectives

The objective of this study was to establish the demographic characteristics, recycling knowledge and habits, and motivational information for Owasso residents. This overall objective is broken down into the following components:

1. Estimate the number of recyclers and nonrecyclers in the Owasso community.
2. Determine what household wastes are recycled the most frequently.
3. Compare the demographic characteristics of the recyclers and nonrecyclers of Owasso.
4. Investigate recycling frequency.
5. Examine the intentions of the Owasso residents to continue recycling in the future.
6. Compare the nonrecyclers' and recyclers' intentions to recycle in the future.

7. Identify the motivation factors which induce recycling behavior.
8. Compare the motivation factors which induce recycling behavior in recyclers and nonrecyclers.
 9. Identify the barriers which detour residents from recycling.
 10. Compare the barriers which detour recyclers and nonrecyclers of Owasso.
 11. Calculate the number of those who have heard of the Owasso Recycling Center (ORC).
 12. Determine characteristics of those who know of the ORC.
 13. Investigate which sources are most effective in informing the public about the recycling center.
 14. Calculate the amount of residents who know where the ORC is located.
 15. Characterize the Owasso residents who have utilized the recycling center.
 16. Determine what Owasso residents currently know about the ORC.
 17. Examine which factors could provide the potential for increasing participation.

Hypotheses

The data were collected, organized, and analyzed to test the following hypotheses:

1. Recyclers are older than nonrecyclers.
2. Recyclers have larger households than nonrecyclers.
3. Recyclers live closer to the ORC than the nonrecyclers.
4. Recyclers have more education than nonrecyclers.
5. Recyclers have a higher household income than nonrecyclers.
6. a. Recyclers are more likely to increase their recycling in the future than nonrecyclers.
 - b. Nonrecyclers are more likely to maintain their current recycling effort in the future than recyclers.

7. Both recyclers and nonrecyclers identify recycling activities with intrinsic incentives.
8. There is no difference in how Owasso recyclers and nonrecyclers identify recycling activities with monetary incentives as a motivation to recycle.
9. Owasso recyclers or nonrecyclers view the barriers to recycling similarly.
10. Recyclers have heard about the ORC more than nonrecyclers.
11. There is no difference between how recyclers and nonrecyclers identify which sources provide them with information about the ORC.
12. More recyclers know the ORC location than nonrecyclers.
13. a. The frequency users and nonusers of the ORC separate recyclable materials from their trash is similar.
 - b. There is no difference in the future recycling plans expressed by users and nonusers of the ORC.
 - c. The distance users and non-users must travel to utilize the ORC is similar.
14. Owasso recyclers were more correct than nonrecyclers in identifying which recyclable materials were collected at the ORC .
15. Nonrecyclers were more unsure about what recyclable materials are collected at the ORC than recyclers.

Assumptions

The assumptions made during the study were as follows:

1. A recycler is anyone who has recycled any recyclable material in the last year.
2. The answers given by respondents to questionnaires were truthful.
3. The survey of Owasso residents provided an accurate sampling of the community.
4. Respondents may have a tendency to inflate their answers and often their intentions are not carried out (DeYoung, 1991).
5. Data collected from the operators of the recycling center were accurate.

Limitations

The limitations of the study included the following:

1. The telephone survey was conducted over a two month period in 1992. The answers to the surveys relied on the honesty of the participants.
2. The conduct of the interview relied heavily on the researcher and various volunteers and contracted employees.
3. Sampling of the residents for the telephone survey was limited to the Owasso directory published by Southwestern Bell.
4. Problems expected to be encountered by using the telephone book to obtain a representative sample included: excluding those who have unlisted numbers, those who may have recently moved or obtained telephones, and excluding a small population of people consider themselves Owasso residents, but have Collinsville telephone numbers.
5. Any background information about the recycling center came from the local paper and the city of Owasso.

CHAPTER IV

RESULTS

Survey Experience

The telephone survey was given to a sample of 394 respondents from the Owasso community to achieve a plus or minus error of margin of 5%. Four surveys were excluded because they were incomplete. The 390 respondents were used to represent the city of Owasso for the purpose of this research.

The survey sample of 390 was taken from a total number of 776 telephone calls which were made during the months of June and July, 1992. Of the surveys obtained, 319 were completed on the first attempt, 49 were completed after one call back, and 22 were completed after two call backs. Those who declined to participate in the survey totaled 219. Interviewers reached numbers with no answer or with answering machines 56 times. The remaining 111 calls were not applicable, due to a variety of reasons including: the participants were too young, hard of hearing, unable to finish the interview, did not consider themselves Owasso residents, or were visitors from out of town who were housesitting. Table V shows the response rates of the telephone survey.

The survey was warmly received by many in the community. Respondents supplied additional comments and made suggestions about the current recycling program in the community. Public comments were recorded and can be found in Appendix C.

Number of Recyclers And Nonrecyclers

Table VI shows the recyclable materials considered when defining whether the participant was a recycler or nonrecycler. Participants who recycled any one of the

recyclable materials listed in Table VI within the last year were defined as a recycler. Of the 390 households sampled, 341 respondents were recyclers and 49 participants were nonrecyclers. The valid percent column, shown in Table VI, shows the percentage each household waste had been recycled by only those respondents who were identified as recyclers.

TABLE V
RESPONSE RATE OF THE OWASSO
TELEPHONE SURVEY

Response	Type of Response	Frequency	Percentage
Positive Response:			
	First Call	319	41.1%
	First Call Back	49	6.3%
	Second Call Back	22	2.8%
Negative Response:			
	Decline	219	28.2%
Other Response:			
	No Answer	36	4.6%
	Answering Machine	20	2.6%
	Not Applicable	111	14.3%
Total:		776	100.0%

Materials Most Frequently Recycled

Determining what household wastes are most frequently recycled was the purpose of objective number three. As can be seen in Table VI, the analysis of the data indicated the material most frequently recycled was aluminum. Of the recyclers surveyed, 86% recycled

aluminum. Newspaper and glass containers followed aluminum cans as the most frequently recycled material. Seventy-three percent of those who recycle had recycled newspaper, and 51% had recycled glass in the last year.

TABLE VI
HOUSEHOLD WASTE RECYCLED

Materials Recycled:	Frequency	Percentage	Valid Percent
Glass	174	44.6%	51.0%
Aluminum	292	74.9%	85.6%
Newspaper	249	63.8%	73.0%
Magazines	79	20.3%	23.2%
Plastic	98	25.1%	28.7%
Office Paper	32	8.2%	9.4%
Cardboard	30	7.7%	8.8%
Steel Cans	25	6.4%	7.3%
Motor Oil	104	26.7%	30.5%
Batteries	90	23.1%	26.4%
Nonrecyclers	49	12.6%	Missing

Demographic Differences Between the Recyclers and the Nonrecyclers

One of the objectives of this thesis was to characterize and compare the recyclers and nonrecyclers of Owasso. The demographic questions in the telephone survey collected data necessary to characterize the Owasso residents and to identify any variations between recyclers and nonrecyclers. Identifying and comparing the characteristics of the two groups helped to define markets for advertising and educating the public about the ORC.

Hypotheses listed from numbers one through five addressed the demographic information needed for characterizing and comparing recyclers and nonrecyclers. A t-test compared the means of the two groups. As a result of the analysis, hypotheses numbers one through five were rejected because there were no significant differences between the Owasso recyclers and nonrecyclers in age, household size, distance from ORC, education, and income.

The selection of the alpha level (.05) was constant throughout the report. The t-test revealed ages of the recycler ($M = 42$) and the nonrecycler ($M = 43$) were not significantly different ($t = -0.55$, $df = 382$, $p < .29$). In reference to household size, the t-test revealed no statistical difference ($t = -0.21$, $df = 385$, $p < .42$) between recyclers and nonrecyclers, both with a mean of 3.2 people per household (see Table VII). The t-test determined that the approximate distance (in miles) that residents lived from the ORC was the same for both recyclers ($M = 1.9$) and nonrecyclers ($M = 2$), $t = -1.43$, $df = 385$, $p < .08$.

TABLE VII
COMPARISON OF THE MEANS BETWEEN THE
RECYCLERS AND THE NONRECYCLERS

Description	Means for Recyclers and Nonrecyclers
Age	42 to 43 years old
Household size	3.2 persons per household
Distance to ORC	2 miles
Education	13 to 14 years
Annual Household Income	\$39,374

A chi-square analysis compared those who lived within the city limits to those who lived on the perimeter of the city limits. It was assumed that those who resided within the city limits lived closer to the ORC than those who lived outside of the city limits. Residence was determined by whether the city trash service or a private trash service collected their trash. The analysis indicated there was no significant difference ($\chi^2 = 2.2$, $df = 1$, $p < .05$) as to where the two groups resided.

Hypothesis four stated that recyclers have more education than nonrecyclers, and hypothesis five stated recyclers have a higher income than nonrecyclers. Hypotheses four and five were rejected by a t-test analysis. To use a t-test analysis for analysing the difference in education, an interval scale was substituted for a nominal scale, and an assumption of the number of years of completed education was made. The nominal scale was converted to a numerical scale accordingly: currently attending high school = 10 years or less of education, attended high school but did not graduate = 11 years of education, graduated from high school = 12 years of education, attended a trade or votech = 13 years of education, graduated from a trade or votech = 14 years of education, attended college but did not graduate = 14 years of education, graduated from college = 16 years of education, and a degree past undergraduate degree = 17 years or more of education. Both groups averaged between 13 and 14 years of completed education, as was seen in Table VII. The results of the t-test indicated no significant difference in education between recyclers and nonrecyclers ($t = 1.16$, $df = 381$, $p < .12$).

Data using a t-test indicated there was no significant difference between the mean incomes of recyclers and nonrecyclers. Hypothesis 5 was rejected. With both groups' annual household income averaging approximately \$39,374 per year, the t-test showed there was no significant difference ($t = .07$, $df = 327$, $p < .47$) in income ranges between the two groups.

Recycling Frequency

Objective 4 examined the recycling frequency of the recyclers, or how often recyclers generally recycle. Table VIII lists the frequency and percentage of all the respondents of the survey, and the valid percentage representing only those who were identified as recyclers. Of those respondents who were identified as recyclers, Table VIII shows 11% performed recycling activities several times a day, 55% performed daily recycling activities, and 17% performed weekly recycling activities. These figure indicated that of those who recycle, the majority (83%) recycled on a frequent bases.

TABLE VIII
RECYCLING FREQUENCY

Recycling Frequency	Frequency	Percentage	Valid Percent
Several/Day	38	9.7%	11.1%
Daily	187	47.9%	54.8%
Weekly	58	14.9%	17.0%
Monthly	31	7.9%	9.1%
Quarterly	14	3.6%	4.1%
Couple Times/Year	10	2.6%	2.9%
Once/Year	3	0.8%	0.9%
Nonrecyclers	49	12.6%	Missing
Total	390	100.0%	100.0%

Future Intentions to Recycle

Examining the intentions of the Owasso residents to recycle in the future was objective five. Table IX shows the frequency of intentions to participate in future recycling activities to be relatively high in Owasso. Of those who participated in the survey, 46% responded that they would maintain their current rate of recycling, and 42% would increase their recycling activities in the future. With 88% of those surveyed stating that they would either recycle at their current rate or would increase their rate of recycling activities in the future, the survey results indicated there is strong demand to recycle in the Owasso community.

TABLE IX
FUTURE RECYCLING INTENTIONS

Future Intentions:	Frequency	Percentage	Valid Percent
Increase	163	41.8%	41.8%
Decrease	3	0.8%	0.8%
Maintain	181	46.4%	46.4%
Never	12	3.1%	3.1%
Don't Know	31	7.9%	7.9%
Total	390	100.0%	100.0%

Comparison of the Future Intentions Between the Recyclers and Nonrecyclers

Objective 6 compares future recycling intentions between the recyclers and nonrecyclers. When a comparison was made between the two groups, a chi-square analysis accepted that the two groups were significantly different ($\chi^2 = 20.5$, $df = 2$, $p < .05$). The analysis rejected hypothesis 6a that recyclers were more likely to increase their recycling than nonrecyclers. The probability ($P = .52$) for recyclers to maintain their current recycling habits was higher than the probability ($P = .42$) of recyclers increasing their recycling habits. The analysis also rejected hypothesis 6b that nonrecyclers are more likely to maintain their current recycling effort in the future than recyclers. The likelihood of nonrecyclers to recycle in the future were less definite, with the majority either increasing ($P = .38$), not knowing ($P = .29$), or never recycling ($P = .25$) in the future.

Motivational Incentives of Recycling

Objective 7 was aimed at discovering the motivational factors which may induce recycling behavior in Owasso residents. The respondents of the survey stated the degree to which a variety of intrinsic and extrinsic statements applied to them in regards to performing recycling activities. As shown in Table X, of the five motivational incentives given in the sample, intrinsic incentives were more popular than monetary incentives.

When accounting for a combination of "strongly agree" and "agree" answers, all respondents (except those answering none of the above) identified conserving natural resources as the highest rated incentive (97%). The second highest reason to participate in recycling activities was 96% for preserving the environment. Recycling because it is the right thing to do placed third (95%) while recycling to support charity was fourth (64%). Recycling to earn money was not a popular motivator for recycling. Monetary incentive had only 34% support (see Table X).

TABLE X
MOTIVATIONAL INCENTIVES OF RECYCLING

Motivational Incentives:	Answers	Frequency	Percentage	Valid Percent
Conserve Natural Resources:				
	strongly agree	93	23.8%	24.8%
	agree	274	70.3%	72.3%
	disagree	10	2.6%	2.6%
	strongly disagree	2	0.5%	0.5%
	none of the above	11	2.8%	Missing
	Total	390	100.0%	100.0%
Preserve Environment:				
	strongly agree	122	31.3%	32.1%
	agree	242	62.1%	63.7%
	disagree	16	4.1%	4.2%
	strongly disagree	0	0.0%	0.0%
	none of the above	10	2.6%	Missing
	Total	390	100.0%	100.0%
Right Thing To Do:				
	strongly agree	68	17.4%	17.8%
	agree	295	75.6%	77.4%
	disagree	17	4.4%	4.5%
	strongly disagree	1	0.3%	0.3%
	none of the above	9	2.3%	Missing
	Total	390	100.0%	100.0%
Support Charity:				
	strongly agree	18	4.6%	4.9%
	agree	215	55.1%	58.6%
	disagree	127	32.6%	34.6%
	strongly disagree	7	1.8%	1.9%
	none of the above	23	5.9%	Missing
	Total	390	100.0%	100.0%

TABLE X (Continued)

Motivational Incentives:	Answers	Frequency	Percentage	Valid Percent
Earn Money:				
	strongly agree	9	2.3%	2.4%
	agree	119	30.5%	31.6%
	disagree	218	55.9%	57.8%
	strongly disagree	31	7.9%	8.2%
	none of the above	13	3.3%	Missing
	Total	390	100.0%	100.0%

Comparison of the Motivational Incentives Between the Recyclers and Nonrecyclers

Objective 8 compared the motivation incentives which induce recycling behavior in recyclers and nonrecyclers. A t-test was applied to the recyclers and nonrecyclers to compare them with the motivational statements. Before applying the t-test to the motivational statements, the likert scale used to score the answers was adjusted. The answer of "none of the above" took on a neutral position and was placed in the center of the number ranking, insuring the t-test was more accurate. The arrangement of the five-point scale was adjusted accordingly: 1 = strongly agree, 2 = agree, 3 = none of the above or neutral, 4 = disagree, 5 = strongly disagree.

Hypothesis 7, which stated there is no difference in how the two groups identified intrinsic incentives in performing recycling activities, was rejected. Both groups agreed that environmental concerns were among the strongest reasons to recycle. As seen in Table XI, preserving the environment was believed to be the strongest motivator for performing recycling activities for both recyclers ($M=1.8$) and nonrecyclers ($M= 2.1$), $t = -3.4$, $df =$

XI, preserving the environment was believed to be the strongest motivator for performing recycling activities for both recyclers ($M=1.8$) and nonrecyclers ($M= 2.1$), $t = -3.4$, $df = 388$, $p < .0003$. Conserving natural resources was the second strongest reason both for recyclers ($M = 1.8$) and non-recyclers ($M = 2.3$), $t = -4.0$, $df = 388$, $p < .00003$.

Following environmentally based incentives, recyclers ($M = 1.9$) indicated they would recycle simply because it is the right thing to do, $t = -5.7$, $df = 388$, $p < .00000001$, but were not motivated by the incentive to support charity ($M = 2.8$), $t = 1.9$, $df = 388$, $p < .03$. Nonrecyclers were neutral as to whether they would be motivated to recycle under both of the intrinsic incentives of recycling simply because it is the right thing to do ($M = 2.5$) and supporting charity ($M = 2.5$).

TABLE XI
COMPARISON OF THE MOTIVATIONAL
INCENTIVES BETWEEN RECYCLERS
AND NONRECYCLERS

Sources	Recyclers	Nonrecyclers
Preserve the Environment	1.8	2.1
Conserve Natural Resources	1.8	2.3
Right Thing To Do	1.9	2.5
Support Charity	2.8	2.5
Earn Money	3.4	2.9

Notes: 1.0 thru 2.4 = the mean indicated an agreement with the statement, 2.6 thru 5.0 = the mean indicated a disagreement with the statement, 2.5 = the mean indicated a neutral position with the statement.

The t-test analysis also compared the recyclers and nonrecyclers to an extrinsic motivation. Hypothesis 8 stated that there were no differences in how Owasso recyclers and nonrecyclers identified recycling activities with monetary incentives. The t-test analysis rejected the hypothesis, revealing there was a significant difference between recyclers or nonrecyclers. However, the mean of both recyclers ($M = 3.4$) and nonrecyclers ($M = 2.9$) showed the monetary incentive was not an incentive to recycling, $t = 2.9$, $df = 388$, $p < .002$.

Barriers to Recycling for Owasso Residents

Understanding the barriers which deter Owasso residents from recycling was objective 9. The telephone survey included statements about things which may keep people from performing recycling activities. Respondents of the survey were asked to what degree each of the barrier statements applied to them. To determine the most significant reason for keeping people from recycling, the answers of "strongly agree" and "agree" were added together to produce a percentage. The answer of "none of the above" was excluded from the valid percentages. Of the eight barriers included in the survey, Table XII shows that 49% of the respondents believed the lack of a recycling facility and/or pick-up service kept them from recycling.

The second most significant reason (45%) for not participating in recycling was simply forgetting to recycle. A lack of storage space in each respondent's household followed, with a 44% agreeing or strongly agreeing (see Table XII). Thirty-six percent of the respondents agreed or strongly agreed that messiness around the household keeps people from recycling. Some respondents commented that recycling clutters their apartment or house. Respondents expressed frustration, including the hassle (32%) and time (29%), involved in recycling activities. Many explained that the convenience of having a curbside or pick up service for recycling would eliminate the need to store the recyclable materials long-term.

TABLE XII
BARRIERS TO RECYCLING ACTIVITIES

Barriers to Recycling:	Answers	Frequency	Percentage	Valid Percent
No Recycle Facility:				
	strongly agree	37	9.5%	9.8%
	agree	146	37.4%	38.8%
	disagree	165	42.3%	43.9%
	strongly disagree	28	7.2%	7.4%
	none of the above	14	3.6%	Missing
	Total	390	100.0%	100.0%
Forget to Recycle:				
	strongly agree	10	2.6%	2.6%
	agree	162	41.5%	42.2%
	disagree	189	48.5%	49.2%
	strongly disagree	23	5.9%	6.0%
	none of the above	6	1.5%	Missing
	Total	390	100.0%	100.0%
Not Enough Storage:				
	strongly agree	21	5.4%	5.4%
	agree	149	38.2%	38.6%
	disagree	206	52.8%	53.4%
	strongly disagree	10	2.6%	2.6%
	none of the above	4	1.0%	Missing
	Total	390	100.0%	100.0%
Too Messy:				
	strongly agree	6	1.5%	1.6%
	agree	133	34.1%	34.5%
	disagree	230	59.0%	59.7%
	strongly disagree	16	4.1%	4.2%
	none of the above	5	1.3%	Missing
	Total	390	100.0%	100.0%
Too Much Hassle:				
	strongly agree	12	3.1%	3.1%
	agree	112	28.7%	29.0%
	disagree	236	60.5%	61.1%
	strongly disagree	26	6.7%	6.7%
	none of the above	4	1.0%	Missing
	Total	390	100.0%	100.0%

TABLE XII (Continued)

Barriers to Recycling:	Answers	Frequency	Percentage	Valid Percent
Not Enough Time:				
	strongly agree	7	1.8%	1.8%
	agree	105	26.9%	27.2%
	disagree	251	64.4%	65.0%
	strongly disagree	23	5.9%	6.0%
	none of the above	4	1.0%	Missing
	Total	390	100.0%	100.0%
Not Worth Money:				
	strongly agree	10	2.6%	2.6%
	agree	76	19.5%	20.1%
	disagree	263	67.4%	69.6%
	strongly disagree	29	7.4%	7.7%
	none of the above	12	3.1%	Missing
	Total	390	100.0%	100.0%
Don't Know How:				
	strongly agree	5	1.3%	1.3%
	agree	65	16.7%	16.8%
	disagree	283	72.6%	73.1%
	strongly disagree	34	8.7%	8.8%
	none of the above	3	0.8%	Missing
	Total	390	100.0%	100.0%

The remaining barrier statements involved money not received from recycling and how to recycle. Only 23% agreed or strongly agreed that the lack of money received from the sale of recyclables was the reason they did not recycle. These findings would indicate that monetary incentives are not as important as convenience. The lowest rated barrier statement included whether or not the respondent's lack of knowledge about recycling kept them from recycling; 18% agreed or strongly agreed.

Comparison of the Barriers Which Deter Recycling Between Recyclers and Nonrecyclers

Objective 10 compared the barriers which deter recyclers and nonrecyclers of Owasso. For the purpose of applying the t-test to analyze the barrier statements, the numerical scales were adjusted. The "none of the above" answer was assumed as a neutral position of neither agreeing or disagreeing with each statement. To improve the accuracy of the t-test analysis, the answers were ranked accordingly: 1 = strongly agree, 2 = agree, 3 = none of the above or neutral, 4 = disagree, 5 = strongly disagree.

Hypothesis 9 stated there was a difference in how Owasso recyclers and nonrecyclers viewed the barriers to recycling. The t-test showed there were significant differences between the two groups with all but two barriers. Those statements which had no significant difference related to recycling facility or pick up service availability ($t = 1.3$, $df = 388$, $p < .10$) and forgetting to recycle ($t = -0.5$, $df = 388$, $p < .31$).

The mean of both groups indicated the barriers were not enough to keep them from performing recycling activities. As seen in Table XIII, the strongest barriers for the recyclers and the nonrecyclers were forgetting to recycle (recyclers $M = 2.7$, nonrecyclers $M = 2.7$) and unavailability of recycling facilities or pick-up services available (recyclers $M = 3.0$, nonrecyclers $M = 2.8$). Other representative examples of inconvenience which were strong with recyclers included the following statements: no room to store recyclables in household ($M = 3.1$), recycling causes messiness around household ($M = 3.4$), recycling is too much of a hassle ($M = 3.5$), and no time to sort the recyclables ($M = 2.8$). Other representative examples of inconvenience which were strong with nonrecyclers included the following statements: no room to store recyclables in household ($M = 2.7$), recycling is too much of a hassle ($M = 2.8$), no time to sort recyclables ($M = 2.9$), and recycling causes messiness around household ($M = 2.9$).

TABLE XIII
COMPARISON OF THE BARRIERS BETWEEN
RECYCLERS AND NONRECYCLERS

Sources	Recyclers	Nonrecyclers
Forget To Recycle	2.7	2.7
No Facility/ Pick-up		
Service Available	3.0	2.8
No Storage Space	3.1	2.7
Too Messy	3.4	2.9
Too Much Hassle	3.5	2.8
No Time	3.5	2.9
No Money	3.6	3.2
Don't Know How	3.8	3.3

Notes: 1.0 thru 2.4 = the mean indicated an agreement with the statement, 2.6 thru 5.0 = the mean indicated a disagreement with the statement, 2.5 = the mean indicated a neutral position with the statement.

The two remaining statements for comparison are the lack of money received from recycling activities and not knowing how to recycle. The t-test analyzing the recyclers and nonrecyclers indicated a significant variation in the degree of disagreement between the Owasso recycler and nonrecycler. The analysis involving the lack of money received from recycling had a mean of 3.6 for recyclers and a mean of 3.2 for nonrecyclers, $t = 2.9$, $df = 375$, $p < .002$. As seen in Table XIII, the analysis regarding the respondent not knowing how to recycle had a mean of 3.8 for recyclers and a mean of 3.3 for nonrecyclers, $t = 3.2$, $df = 383$, $p < .0006$.

Respondents Who Have Heard of the ORC

Identifying what residents of Owasso knew about recycling in their community was important when implementing an educational program to increase participation at the ORC.

One objective (11) examined how many residents knew or had heard of the center. As seen in Table XIV, among the 390 respondents, 83% had heard of the ORC.

TABLE XIV
RESPONDENTS WHO HAVE HEARD
OF THE ORC

Heard of the ORC	Frequency	Percentage	Valid Percent
Yes	325	83.3%	83.3%
No	65	16.7%	16.7%
Total	390	100.0%	100.0%

Another objective (12) determined the characteristics of those who had heard of the ORC. More recyclers had heard of the ORC than nonrecyclers according to hypothesis 10. According to a t-test analysis, there is a significant difference ($t = 4.39$, $df = 386$, $p < .000007$) between the number of recyclers and nonrecyclers who had heard of the ORC. The t-test accepted the hypothesis that there were more recyclers ($M = 87$) who had heard of the ORC than nonrecyclers ($M = 62$).

Sources Informing the Owasso Residents of the ORC

Objective 13 investigated which sources were most effective in informing the public about the ORC. Of those respondents who were aware of the ORC, Table XV shows that the newspaper (43%) and the city's efforts to promote the ORC through mailings (28%) had been the most effective sources of advertisement reaching of the public. Word of

Objective 13 investigated which sources were most effective in informing the public about the ORC. Of those respondents who were aware of the ORC, Table XV shows that the newspaper (43%) and the city's efforts to promote the ORC through mailings (28%) had been the most effective sources of advertisement reaching of the public. Word of mouth by a combination of family, with a rating of 29%, and friends, with a rating of 36%, followed. However, no single source captured even half of the residents.

TABLE XV
SOURCE OF INFORMATION
ABOUT THE ORC

Sources	Frequency	Percentage	Valid Percent
Newspaper	140	35.9%	43.1%
Mailings	92	23.6%	28.3%
Friends	118	30.3%	36.3%
Family	93	23.8%	28.6%
School	34	8.7%	10.5%
Radio	8	2.1%	2.5%
Television	20	5.1%	6.2%
Work	18	4.6%	5.5%
Posters	22	5.6%	6.8%

Comparison of the Most Effective Sources of Informing
the Recyclers and the Nonrecyclers about the ORC

Hypothesis 11 stated that there was no difference between how recyclers and nonrecyclers identified with information sources. A t-test analysis was applied to the each of the sources to compare the difference between recyclers and nonrecyclers. The results

However, as seen in Table XVI, a comparison of the difference between the mean of the recyclers and nonrecyclers with each source revealed that recyclers had been informed about the ORC from more sources than the nonrecyclers. More recyclers had heard about the ORC from newspaper, mailing, friends, family, and school than nonrecyclers. More nonrecyclers had heard of the ORC from radio, television, work, and posters than recyclers. Both groups heard of the ORC from newspaper, friends, family and mailings more than from any other source listed.

TABLE XVI
COMPARISON OF THE SOURCES BETWEEN
RECYCLERS AND NONRECYCLERS

Sources	Comparison	Recyclers	Nonrecyclers
Newspaper	O	36.9%	27.6%
Mailings	O	28.8%	24.0%
Friends	O	36.9%	27.6%
Family	O	29.5%	20.7%
School	O	10.8%	6.9%
Radio	X	2.4%	3.5%
Television	X	5.8%	10.3%
Work	X	5.1%	6.9%
Posters	X	6.1%	14.0%

Notes: O = more recyclers had heard of the ORC from these sources than nonrecyclers, X = more nonrecyclers had heard of the ORC from these sources than recyclers.

Knowledge of ORC Location

Objective 14 determined whether residents knew where the ORC was located. Of those who had heard of the ORC, an overwhelming 86% knew the approximate location (see Table XVII). Hypothesis 12 stated that more recyclers knew the ORC location than did nonrecyclers. A t-test indicated there was a significant difference ($t = 3.5$, $df = 321$, $p < .0002$) between the recyclers and nonrecyclers. The analysis confirmed the hypothesis that more recyclers ($M=88$) knew the location of the ORC than did the nonrecyclers ($M=64$).

TABLE XVII
LOCATION OF THE ORC

Location of ORC	Frequency	Percentage	Valid Percent
Yes	278	71.3%	85.5%
No	47	12.1%	14.5%
Not Applicable	65	16.7%	Missing
Total	390	100.0%	100.0%

Characteristics of Those Respondents

Who Utilize the ORC

Objective 15 characterized the respondents who utilized the ORC. Of those participants who had heard of the ORC, 72% replied that they had used the recycling center (See Table XVIII).

Hypothesis number 13a indicated there was no significance in the frequency between users, those recyclers who have utilized the ORC, and non-users, those recyclers who had never heard of the ORC. The t-test analysis rejected ($t = 3.1$, $df = 338$, $p < .001$) the hypothesis, concluding there was a significant difference between both groups. Users of the center recycled on a daily basis ($M = 2.4$) and the non-users recycle on a weekly basis ($M = 2.8$).

TABLE XVIII
USE OF THE ORC

Used the ORC	Frequency	Percentage	Valid Percent
Yes	234	60.0%	72.0%
No	91	23.3%	28.0%
Not Applicable	65	16.7%	Missing
Total	390	100.0%	100.0%

Hypothesis 13b also indicated there was no difference between the future intentions to recycle as expressed by the users and non-users of the ORC. A chi-square analysis concluded there was no significant difference between the users and the non-users' future intentions to recycle, $X^2 = 1.2$, $df = 2$, $p < .05$.

A t-test analyzed hypothesis 13c, the distance travelled by users and non-users of the ORC. There was no significant difference in distance between the users ($M = 2$ miles) and non-users ($M = 2$) of the ORC, $t = 1.2$, $df = 338$, $p < 0.1$.

Owasso Residents Knowledge of Currently
Accepted Recyclable Materials at the ORC

Objective 16 was aimed at determining whether respondents understood what materials were acceptable at the ORC. Respondents who had heard of the ORC were asked to identify acceptable recyclables. Out of 15 recyclable materials read, the majority of the respondents clearly identified aluminum cans, newspapers, and glass containers as materials currently accepted at the ORC. The profile of each recycling material correctly identified is listed in Table XIX.

TABLE XIX
RECYCLABLES IDENTIFIED CORRECTLY

Recyclables Identified:	Answer	Frequency	Percentage	Valid Percent
Aluminum Cans:				
	Yes	283	72.6%	87.1%
	No	2	0.5%	0.6%
	Not Sure	40	10.3%	12.3%
	Not Applicable	65	16.7%	Missing
	Total	390	100.0%	100.0%
Newspaper:				
	Yes	262	67.2%	80.6%
	No	9	2.3%	2.8%
	Not Sure	54	13.8%	16.6%
	Not Applicable	65	16.7%	Missing
	Total	390	100.0%	100.0%

TABLE XIX (Continued)

Recyclables Identified:	Answer	Frequency	Percentage	Valid Percent
Glass Containers:				
	Yes	256	65.6%	78.8%
	No	6	1.5%	1.8%
	Not Sure	63	16.2%	19.4%
	Not Applicable	65	16.7%	Missing
	Total	390	100.0%	100.0%

Of those recyclable materials listed in Table XX, only used motor oil, antifreeze and car batteries were currently accepted at the ORC. The majority of those sampled did not know, or were not sure, about acceptability. Of the 12 remaining recyclable materials listed in Table XX, office paper was answered wrong and found to be the least understood by a total of 92.6%. During the first period of operation, the ORC accepted office paper. Due to the high contamination rate of the paper collected, it was not feasible for the ORC to continue collecting office paper. The fact that office paper was once collected at the center, but was no longer collected, could very well be the reason for the high rate of confusion for this particular recyclable material.

Following office paper in descending order as the most mistaken or least understood recyclable material was: other aluminum (89.6%) (such as tin foil or pie tins), other glass (88%) (such as window or plate glass), used antifreeze (85.5%), cardboard (85.2%), rubber tires (79.4%), plastic (78.8%), magazines (76.6%), tin/steel cans (75.7%), used motor oil (61.2%), and batteries (57.9%). The ORC once accepted cardboard, but has since discontinued collection because the product was not economically feasible.

TABLE XX
RECYCLABLES INCORRECTLY IDENTIFIED

Recyclables Identified:	Answer	Frequency	Percentage	Valid Percent
Office Paper:				
	Yes	139	35.6%	42.8%
	No	24	6.2%	7.4%
	Not Sure	162	41.5%	49.8%
	Not Applicable	65	16.7%	Missing
	Total	390	100.0%	100.0%
Other Aluminum:				
	Yes	114	29.2%	35.1%
	No	34	8.7%	10.5%
	Not Sure	177	45.4%	54.5%
	Not Applicable	65	16.7%	Missing
	Total	390	100.0%	100.0%
Other (Plate) Glass:				
	Yes	80	20.5%	24.6%
	No	39	10.0%	12.0%
	Not Sure	206	52.8%	63.4%
	Not Applicable	65	16.7%	Missing
	Total	390	100.0%	100.0%
Used Antifreeze:				
	Yes	54	13.8%	16.6%
	No	47	12.1%	14.5%
	Not Sure	224	57.4%	68.9%
	Not Applicable	65	16.7%	Missing
	Total	390	100.0%	100.0%
Cardboard:				
	Yes	115	29.5%	35.4%
	No	48	12.3%	14.8%
	Not Sure	162	41.5%	49.8%
	Not Applicable	65	16.7%	Missing
	Total	390	100.0%	100.0%

TABLE XX (Continued)

Recyclables Identified:	Answer	Frequency	Percentage	Valid Percent
Rubber Tires:				
	Yes	40	10.3%	12.3%
	No	67	17.2%	20.6%
	Not Sure	218	55.9%	67.1%
	Not Applicable	65	16.7%	Missing
	Total	390	100.0%	100.0%
Plastic:				
	Yes	128	32.8%	39.4%
	No	69	17.7%	21.2%
	Not Sure	128	32.8%	39.4%
	Not Applicable	65	16.7%	Missing
	Total	390	100.0%	100.0%
Magazines:				
	Yes	108	27.7%	33.2%
	No	76	19.5%	23.4%
	Not Sure	141	36.2%	43.4%
	Not Applicable	65	16.7%	Missing
	Total	390	100.0%	100.0%
Tin/Steel Cans:				
	Yes	61	15.6%	18.8%
	No	79	20.3%	24.3%
	Not Sure	185	47.4%	56.9%
	Not Applicable	65	16.7%	Missing
	Total	390	100.0%	100.0%
Used Motor Oil:				
	Yes	126	32.3%	38.8%
	No	32	8.2%	9.8%
	Not Sure	167	42.8%	51.4%
	Not Applicable	65	16.7%	Missing
	Total	390	100.0%	100.0%

TABLE XX (Continued)

Recyclables Identified:	Answer	Frequency	Percentage	Valid Percent
Batteries:	Yes	137	35.1%	42.2%
	No	34	8.7%	10.5%
	Not Sure	154	39.5%	47.4%
	Not Applicable	65	16.7%	Missing
	Total	390	100.0%	100.0%

Comparison of Knowledge of Currently Accepted Recyclable
Materials at the ORC Between Recyclers and Nonrecyclers

Hypothesis 14 stated that Owasso recyclers were more correct than nonrecyclers in identifying which materials were recycled at the ORC. The mean for each correctly defined recyclable material listed was compared. A paired t-test analysis showed there was a significant difference in recyclers and nonrecyclers knowledge of recyclable materials collected at the ORC, $t = 2.6$, $df = 13$, $p < .01$. The analysis showed recyclers ($M = 35$) identified more recyclable materials correctly than that of nonrecyclers ($M = 27$). Table XXI lists the percentages of the recyclable materials identified correctly.

Hypothesis 15 indicated nonrecyclers were more unsure than recyclers about which materials were accepted at the ORC for recycling. When comparisons were made between the recyclers and nonrecyclers, the results of a paired t-test analysis indicated there was no significant difference between the two groups, $t = -1.5$, $df = 13$, $p < .08$. Table XXII lists the percentage of recyclable materials identified by recyclers and nonrecyclers as uncertain.

TABLE XXI
 PERCENTAGE OF RECYCLABLE MATERIALS
 IDENTIFIED CORRECTLY BY RECYCLERS
 AND NONRECYCLERS

Recyclable Materials	Recyclers	Nonrecyclers
Glass Containers	81%	52%
Other (Plate) Glass	11%	21%
Newspaper	83%	55%
Cardboard	15%	10%
Magazines	25%	10%
Office Paper	7%	7%
Aluminum Cans	89%	66%
Other Aluminum	10%	14%
Rubber Tires	20%	24%
Tin/Steel Cans	25%	21%
Plastic	22%	10%
Batteries	43%	35%
Used Motor Oil	39%	33%
Used Antifreeze	17%	14%

TABLE XXII
 PERCENTAGE OF RECYCLABLE MATERIALS
 IDENTIFIED AS UNSURE BY RECYCLERS
 AND NONRECYCLERS

Recyclable Materials	Recyclers	Nonrecyclers
Glass Containers	17%	41%
Other (Plate) Glass	11%	21%
Newspaper	15%	38%
Cardboard	51%	38%
Magazines	43%	52%
Office Paper	50%	52%
Aluminum Cans	10%	31%
Other Aluminum	54%	62%
Rubber Tires	68%	62%
Tin/Steel Cans	57%	59%
Plastic	39%	41%
Batteries	47%	52%
Used Motor Oil	51%	52%
Used Antifreeze	69%	66%

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary and Conclusions

Owasso has the first city owned and operated recycling center in the State of Oklahoma. The Owasso Recycling Center (ORC) is a model for communities, and many look to Owasso for answers to questions about developing and implementing a recycling program. However, the city of Owasso would be the first to recognize that recycling has not been a money making investment. Since the ORC's opening in 1988, it has been subsidized by the city, and continues to be a financial burden. The high costs of running the program are due to a number of factors, including high labor costs, low market prices for recyclables, and low volume of recyclables.

This study can be the first phase in determining ways to increase recycling participation at the ORC. By determining how much residents currently know about local recycling, a program could be developed to improve public knowledge and motivation. By understanding the barriers to recycling and the public motivations, the city could improve the utilization of the recycling center.

Owasso Recyclers and Nonrecyclers

The recycling telephone survey was a useful means of obtaining a representative sample of the Owasso community. Owasso residents who responded to the survey were categorized as either a recycler or a nonrecycler. For this study, a recycler was anyone who recycled any of the following recyclable materials in the last year: glass, aluminum, newspaper, magazines, plastic, office paper, cardboard, steel cans, motor oil, or batteries.

The survey showed 87% of the respondents were recyclers. This response indicated overwhelming support for the concept and procedure of recycling. The percentage of recyclers was much higher than Vining and Ebreo's (1990) research comparing the recyclers and nonrecyclers of Champaign-Urbana, Illinois. Of those who responded to their mail-out questionnaire, 56% were recyclers. However, of the 500 mail-out questionnaires, only 39% responded. This can be compared to the 50% response rate of the Owasso telephone survey. The method of sampling and the size of the sample indicated the sample was representative of the Owasso population. From this survey one can conclude that 5,568 Owasso family units, or approximately 17,818 persons in Owasso, would be recyclers.

The results of a t-test analysis indicated no difference existed between recyclers and nonrecyclers based upon age, household size, distance from the ORC, income, and education. The results found that recyclers and nonrecyclers were approximately 42 to 43 years in age and had a mean household size of 3.2 persons. The majority of residents lived two miles from the ORC and the study found there was no difference between recyclers and nonrecyclers with respect to living within or outside Owasso city limits. The mean education of the two groups was approximately 13 to 14 years, indicating that the majority of residents had some education or training after high school. There was no difference in household income between recyclers and nonrecyclers, with the mean income of each group averaged approximately \$39,374 per year.

The Owasso community is rural and suburban, and it does not share in the population diversity of a university town such as Champaign-Urbana, Illinois, used in the Vining and Ebreo (1990) study. The analysis applied to each of the demographic characteristics showed that recyclers and nonrecyclers were demographically homogeneous. Therefore, the researcher concluded that no significant differences existed between Owasso recyclers and nonrecyclers in any of the demographic factors. This was surprising because the

results from Vining and Ebreo's study showed recyclers were older and had a slightly higher income than nonrecyclers.

Recycling Frequency and Future Intentions to Recycle

Frequency of recycling, or how often respondents separated their recyclable materials from their trash, was surveyed to estimate how often those respondents were carrying out recycling activities. The future intentions to recycle helped determine if pro-recycling attitudes existed for future recycling efforts and whether people perceived their recycling habits as increasing in the future. The analysis showed that the majority of Owasso respondents (83%) were performing recycling activities several times daily, daily, or weekly. The high frequency may indicate success of the initial education programs. However, DeYoung (1991) suggested respondents may have a tendency to inflate their answers because recycling is becoming a socially acceptable behavior. The measurement of the frequency did not include the consistency respondents recycle.

Of the 390 Owasso residents who responded to the survey, an overwhelming majority (88%), believed they would either increase their recycling effort or maintain their current recycling effort in the future. Like the Owasso results, DeYoung (1991) determined that a significant percentage of respondents would increase their recycling participation in the future. Therefore, the researcher concluded that residents of Owasso have a pro-recycling attitude, and increased recycling behavior is anticipated in the future. It could also be concluded that use of the ORC has the potential for significant increased usage.

The chi-square analysis concluded that the probability of recyclers maintaining current recycling habits was greater than increasing recycling habits. Nonrecyclers will either increase ($P = .38$), never recycle ($P = .25$), or did not know whether they would recycle ($P = .29$) in the future. Therefore, there is an opportunity for converting all but one in four nonrecyclers to perform recycling activities in the future.

The analysis of the recyclable materials concluded that of those who had recycled in the last year, the majority had limited themselves to recycling three recyclable materials including: aluminum (87%), newspaper (73%), and glass containers (51%). In DeYoung's (1991) study, the same three recyclable materials were found to be the most commonly recycled. However, the majority of Michigan respondents indicated they recycle newspapers most often, and this was followed by glass containers and metal cans or aluminum.

Motivational Incentives

Of the motivational incentives listed in the survey, intrinsic incentives are more effective than extrinsic incentives (see Appendix B). This was also true in the study conducted by DeYoung (1991). Of the intrinsic incentives, the majority of Owasso respondents believed conserving natural resources (97%) and preserving the environment (96%) were the best incentives to recycling. Other intrinsic incentives included recycling because it is the right thing to do (95%) and recycling to support charity (65%). The least popular reason to recycle was the extrinsic incentive of recycling for money (34%). The only difference between the Owasso study and DeYoung's (1991) was that supporting charity followed environmental concerns as the second best incentive to recycling in DeYoung's study. Recycling to support charity was followed by recycling because it is the right thing to do and recycling for monetary value.

A comparison of the motivational incentives showed significant differences between the recyclers and nonrecyclers. Like that of Vining and Ebreo's (1990) study, the Owasso recyclers and nonrecyclers agreed that preserving the environment and conserving natural resources were the best incentives to recycling. Nonrecyclers were neutral when responding to either of the intrinsic incentives, including recycling because it is the right thing to do or recycling to support charity. More nonrecyclers agreed money was a motivator to recycling; however, both groups agreed the monetary incentive was a weak

motivator to recycling. This finding agreed with Vining and Ebreo's who found that overall, the extrinsic incentive was the weakest motivator of all the statements.

Barriers to Recycling

The residents of Owasso agreed that of the barriers listed in the survey the desire for a more convenient method of recycling, coupled with simply forgetting to recycle, were the two strongest barriers (see Appendix B). The barriers with the least impact on residents included the lack of monetary value involved in the sale of recyclables and residents not knowing how to recycle.

The Owasso residents agreed that the lack of a recycling facility and/or pick-up services was the strongest (49%) barrier to recycling. Because the majority (83%) of Owasso residents have heard of the ORC, the researcher concluded that citizens are not as frustrated with the lack of a recycling facility as they are about the desire for a recycling pick-up service, or curbside service. The desire for a more convenient method of recycling was reinforced by respondents expressing agreement with general household inconveniences including the following: not enough room to store the recyclables in household (44%), recycling causes messiness around house (36%), recycling is too much of a hassle (32%), and not enough time to sort the recyclables in household (29%). Comments by the respondents at the end of the survey indicated a desire for a curbside or pick-up recycling service and a more convenience method of recycling (see Appendix C). For the 17% of those respondents who have not heard of the ORC, they may have agreed that the lack of a recycling facility keeps them from recycling because they were unfamiliar with the ORC.

The second strongest barrier to recycling was that respondents simply forgot to recycle (45%). Therefore, residents of Owasso need frequent reminders on why they should recycle, what is recyclable, and where to recycle.

The barrier with the least impact to recycling included the lack of money received from the sale of recyclable materials (23%) and not knowing how to recycle (18%). Nearly one in five of the respondents did not feel they knew how to recycle. DeYoung's (1991) findings indicated a much different order of barriers associated with recycling. He found that the majority of respondents believed lack of information about recycling, or the statement of not knowing exactly what to do, kept them from recycling the most. Of all the barrier statements listed, not knowing how to recycle was the least form of a barrier for Owasso residents. A reason for the low rating could be due to the rewording of the statement from "I don't know just what to do" to "I don't know how to recycle." By using the latter statement, the meaning of the statement changed. Residents could have found the statement insulting and therefore responded negatively to the statement.

With the exception of two barrier statements, lack of a recycling facility or pick-up services and forgetting to recycle, there was a significant difference between the recyclers and the nonrecyclers. A comparison of the mean between the recyclers and nonrecyclers for each barrier statement showed neither group agreed that any of the barrier statements were strong enough to keep them from recycling. Both recyclers and nonrecyclers agreed that the strongest barriers to recycling were forgetting to recycle and lack of a recycling facility and/or pick-up service. Two barrier statements, including recycling for monetary value and simply not knowing how to recycle, were the least likely barriers for recyclers and nonrecyclers.

The t-test revealed a significant difference between recyclers and nonrecyclers when comparing the other inconveniences, including hassles, no time, no storage, and messiness. Of the four barriers, the mean of each indicated that recyclers and nonrecyclers did not feel strongly about any of the potential barriers to recycling. Vining and Ebreo (1990) indicated that in a recycling program which does not provide a convenient means to recycle, educational programs are necessary to tell residents of the long-term hazards of not recycling.

Knowledge of the ORC

Of the respondents interviewed, 83% had heard of the ORC. A comparison of the recyclers and nonrecyclers revealed a significant difference between the two groups with more recyclers (mean = 87) having heard of the ORC than nonrecyclers (mean = 62). Those respondents who had heard of the ORC were asked to identify the sources from which they had received information. Newspapers (43%) were the most popular source of information, with friends (36%), family (24%), and mailings (24%) coming next. With the exception of schools (11%), each of the remaining sources, including radio, television, work, and posters, captured less than 10% of those who had heard of the ORC. These results indicated that not one of the sources listed individually captured the attention of the majority. Perhaps none of the sources listed had been used to their maximum potential.

A t-test compared recyclers and nonrecyclers' acknowledgement of various sources of information. There was no significant difference between recyclers and nonrecyclers. However, like that of Vining and Ebreo (1990), a comparison of the mean did reveal that recyclers have heard about the ORC from more sources of information than nonrecyclers. More recyclers have heard of the ORC from newspapers, mailings, friends, family, and school than nonrecyclers. More nonrecyclers have heard of the ORC from radio, television, work, and posters than recyclers. Both recyclers and nonrecyclers have heard of the ORC from newspaper, friends, family, and mailings more than from other sources. There were differences between the Owasso results and the Vining and Ebreo's (1990) study. Vining and Ebreo indicated the most popular media for recyclers was the radio and friends. Newspapers, television, posters, mailings, school programs and work were equally as informative for both Owasso groups.

Of those respondents who have heard of the ORC, 86% indicated they knew where the ORC was located. A comparison between recyclers and nonrecyclers revealed more recyclers (mean = 88) knew where the ORC was located than nonrecyclers (mean = 64). Therefore, recyclers were more familiar with the location and were more active and

interested in recycling programs than nonrecyclers. Comments illustrating respondents' desire for more information on the location of the ORC are shown in Appendix C.

Of those respondents who have heard of the ORC, 72% replied that they had used the ORC. A comparison was made between the users (those recyclers who have used the ORC, and non-users, those who are recyclers but had never heard of the ORC) to detect differences in recycling frequency, intentions to recycle in the future, and travel distances to utilize the ORC. The results indicated both groups recycle frequently; however, there is a significant difference between the groups concerning the frequency that they separated recyclable materials from their trash. More users of the ORC performed recycling activities on a daily basis, while the non-users performed recycling activities on a weekly basis. There was no significant difference between the two groups in regards to future intentions to recycle or travelling distance to the ORC.

Recyclable Materials Accepted at the ORC

Those respondents who had heard of the ORC correctly identified three of the 15 recyclables listed: aluminum cans (87%), newspapers (83%), and glass containers (81%). Those recyclables which are accepted at the ORC, but were not correctly identified included: motor oil (61%), antifreeze (83%), and car batteries (58%).

Respondents either misunderstood or answered the following incorrectly: other aluminum (90%), window or plate glass (88%), cardboard (85%), rubber tires (79%), plastic (79%), magazines (77%), and tin/steel cans (76%). None of these materials are currently accepted at the ORC. The majority of residents remain unsure as to what recyclables are collected at the ORC.

A comparison of the recyclers and nonrecyclers who had heard of the ORC showed a significant difference between those who correctly identified the recyclable materials accepted by the ORC. Like the study conducted by Vining and Ebreo (1990), the results showed that more recyclers (mean = 35) correctly identified the recyclable materials than

nonrecyclers (mean = 27). The results of a paired t-test rejected the hypothesis, concluding that there was no significant difference in the uncertainty demonstrated by recyclers and nonrecyclers.

Recommendations

The Owasso residents have pro-recycling attitudes and they frequently participated in recycling behavior. Increased advertising and information programs which inform people about the ORC and what materials are recycled there would provide a reminder to the recyclers to participate or even increase recycling participation. Because no significant demographic difference is found between the two groups, the city should use broadly focused campaigns which reach out to the entire population using all sources of information available.

Education and awareness programs, which stress why residents should recycle and the benefits of recycling, or the consequences of not recycling, would be effective in influencing a nonrecycler to recycle and encouraging recyclers to increase recycling activities. Because the results show intrinsic incentives are much more effective motivators than extrinsic incentives, every public information program developed by Owasso should stress the benefits of conserving natural resources, the value of preserving the environment, and the self-satisfaction recycling gives because it is the right thing to do. The quality of the environment is enhanced by reducing the solid waste generated, increasing the life expectancy of landfills in operation, decreasing the need for constructing more landfills, and decreasing pollution of natural resources. Energy is also conserved when the energy needed to make products from recyclable materials is less than products made from virgin materials. These are examples of intrinsic reasons for recycling and of the positive effects recycling has on the environment.

The expressed frustration when performing recycling activities was due to household inconveniences and a desire for a recycling pick-up or curbside service. The respondents

agreed a curbside recycling service would be a more convenient method and would increase their rate of participation. Although the respondents were justified in thinking that the implementation of a curbside service would provide more convenience and increase their participation in recycling activities, there are a variety of problems associated with implementing a curbside service at this time. One of the main difficulties is the revenue necessary to implement and operate the program. If the 1988 thru 1989 operational costs are an indication of the revenue needed to operate the program, Owasso has invested approximately \$35,000 per year for the last three years. Before additional services, such as a curbside service, are added, more emphasis should be devoted to the recycling education programs, advertising campaigns promoting recycling participation, and the use of the ORC staff to increase participation. Other alternatives for expanding the ORC could include a number of small collection centers located in a variety of convenient locations, such as shopping malls or along commuter routes. Curbside recycling service should be reconsidered in the future.

Because the survey clearly indicated the residents do not remember to recycle, frequent reminders are needed about the recycling facilities' availability, and that recycling is necessary to preserve the environment and conserve natural resources. Examples of ways to inform and encourage residents to participate in the ORC could include: radio, signage, including billboards and posters advertising the ORC, placed in highly trafficked areas throughout Owasso or on city trucks, and the creation of an Owasso Recycling Hotline to answer any questions or comments citizens have about recycling. In addition, a more effective use of the ORC staff could be made to actively promote the center by speaking to groups of citizens about recycling and the ORC, providing tours of the facility, and establishing an extension program to help or educate those who cannot come to the ORC.

Public schools are another source of information underutilized by the city. The typical household size of the respondents is four persons and the mean is 3.2 persons,

which would indicate that many of the households have school-aged children (see Appendix B). By emphasizing the impact recycling activities have on the environment through education programs and presentations in the public schools, the children may encourage recycling activities at home.

The results show most media sources are ineffective by themselves as a means to advertise and promote the ORC. Of the sources listed in the survey, the residents agreed that newspapers and mailing were their predominant information sources (see Appendix B). It is therefore recommended that the city promote the ORC as often as possible, blanketing the population of Owasso with information using a variety of media.

A recycling awareness program which targets both the users and the non-users is needed to increase the participation of the ORC. Seventy-two percent of the respondents indicated they had used the ORC at least once. It is not known how often these respondents frequented the ORC; however, the users claimed they performed recycling activities, separating their recyclable materials from trash, on a daily basis. The recyclers plan to maintain current recycling efforts or to increase their recycling efforts in the future. Owasso should encourage those users to continue to utilize the ORC and to use intrinsic incentives which enhance the altruistic behaviors.

Another group the city should encourage to use the ORC are the non-users, those residents who are recyclers but have not used the ORC. The results of the analysis showed the non-users perform recycling activities frequently (on a weekly basis) and have future plans to either maintain or increase their recycling in the future. Until recently, it was assumed that those who did recycle, but did not use the ORC, were using the convenience of another local recycling facility. Implementation of a recycling awareness program which provides information about the ORC could convert the non-users, who had never heard of the ORC, to become users of the Center. An opportunity exists for the city to tap into the pro-recycling attitudes; encouragement to recycle could boost the participation rate for the ORC and thus make recycling more cost effective.

Because residents of the community do not have clear knowledge of what recyclable materials are collected at the ORC, the city of Owasso clearly needs to improve the education programs which focus on what materials are currently accepted at the center. The city should address why some materials are not collected at the ORC. Because they were once collected at the center, nonacceptance of office paper and cardboard confuses residents. The city should also address why plastics and tin/steel cans are not accepted. As can be seen in Appendix C, some residents believe the ORC recycles magazines and others scolded Owasso for not accepting magazines at the ORC. Residents have a pro-recycling attitude, but are confused by the lack of clear local recycling information.

In summary, the city of Owasso needs to invest in educational and promotional programs designed to increase the participation of ORC. There are a number of sources available to inform the residents about local recycling opportunities. Extensive use of the local newspaper, radio stations, mailings or flyers in monthly billings, and signage (such as billboards and posters), offer effective media for addressing recycling awareness and the presence of the ORC to the Owasso residents. Reaching out to the public schools is an inexpensive and effective means of allowing the children of Owasso to stay informed of local recycling opportunities and become actively involved. Activities directed by the ORC could include: tours of the facility, workshops on recycling, and speaking to classrooms or civic groups interested in finding out more about recycling. Recruiting volunteers to assist in the program is another form of public awareness through individual contact. Volunteers could be used in an out-reach program to assist those residents who are unable to commute to the ORC, but want to recycle, by providing a pick-up service. By using the variety of media available on a frequent and consistent basis, public information programs could effectively communicate recycling awareness to all the residents of the community.

One of the topics the city's educational programs should address is basic information relating to the ORC. The city should concentrate on informing the public on general topics

including: where the ORC is located, what recyclables are collected at the ORC, what recyclables are not collected at the ORC and why, and how to prepare the materials for acceptance at the ORC.

Secondly, the education programs should be designed to connect recycling activities directly with environmental concerns. Programs should demonstrate how recycling can benefit the environment and the long-term hazards effects not recycling will have on our environment if recycling does not become an intricate part of everyone's daily life. It could be beneficial to inform residents that future state and federal regulations will have a direct effect on the closure of many local landfills. As a result, the disposal costs for solid waste will increase. By reducing the solid waste generated, and curbing the cost of disposal, people may be apt to participate in recycling activities. Therefore, the city of Owasso should implement widespread educational and motivational programs designed to increase the residents' awareness of what impacts recycling, or the consequences not recycling have on our environment.

The desire of the Owasso respondents to have a curbside service is strong. By identifying the most cost effective means to implement curbside pick-up service, implementation of such a program should be considered in the future. Another suggested alternative would be to provide numerous collection centers at a variety of locations throughout town, such as shopping centers. This may provide the convenience needed to increase participation in recycling by making the program more visible and accessible to residents. It is the assumption of the researcher that many of the residents are commuters who are employed in nearby metropolitan areas. An analysis could be performed investigating the travel pattern of the majority commuters, assessing the percentage of those who drive by the ORC verses alternative routes, on their way to or from work. Positioning collection centers in strategic location where commuters pass could be another opportunity to increase visibility and accessibility to residents and increase participation in recycling.

If the ORC is to witness any long-term significant increase in recycling participation, supplemental funding for the city may be a necessity. Additional funding such as bond issues, city tax increases, or voluntary donations through monthly billings are just a few suggestions which could help enhance the ORC and create long-term participation.

The survey showed the majority of residents had pro-recycling attitudes with frequent recycling habits and intentions to recycle in the future. These findings are positive reinforcement that recycling is popular in Owasso, however research is needed to quantify how often and consistently residents actually recycle.

Finally, further research should investigate the influences, such as culture, demographics or geography, that cause such high rates of participation. Prior recycling studies are limited to researching recycling behaviors in college towns or metropolitan cities. Portland, Oregon is an environmentally progressive city unlike the majority of the cities in the United States. Distinct demographic differences exist between a college town and those communities without a university. More research involving recycling participation should extend to communities other than metropolitan cities and college towns.

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APPENDIXES

APPENDIX A
DEFINITION OF TERMS

DEFINITION OF TERMS

Altruism

Altruism is a behavior that benefits others at some cost to the individual. According to most social scientists, altruism occurs when one individual consciously comes to the aid of another, without expecting anything in return (Grolier Electronic Publishing, Inc., 1991).

Bulky Waste

Bulky waste is large items of refuse including, but not limited to, appliances, furniture, large auto parts, nonhazardous construction and demolition materials, trees, branches and stumps which cannot be handled by normal solid waste processing, collection, and disposal methods (Environmental Protection Agency, 1989).

Buy-Back Center

A buy-back center is a facility where individuals bring recyclables in exchange for payment (Environmental Protection Agency, 1989).

Convenience Station

A designated location where citizens may dispose of some types of unwanted bulky waste and detour citizens from roadside dumping (Ray, 1988).

Corrugated Paper (Cardboard)

Paper or cardboard manufactured in a series of wrinkles or folds, or into alternating ridges and grooves (Environmental Protection Agency, 1989).

Curbside Collection

Curbside collection involves programs where recyclables materials are collected at the curb, often from special containers, to be brought to various processing facilities (Environmental Protection Agency, 1989).

Extrinsic Incentives

Extrinsic incentives motivate people to perform activities with the promise of tangible returns, such as monetary value or coupons (DeYoung, 1985).

Drop-Off Center

A drop-off center is a method of collecting recyclable or compostible materials which are taken by individuals to collection sites and deposited into designed containers (Environmental Protection Agency, 1989).

Ferrous Metals

Metals that are derived from iron. They can be removed using large magnets at separation facilities (Environmental Protection Agency).

Hazardous Waste

Waste material that may pose a threat to human health or the environment, the disposal and handling of which is regulated by federal law (Environmental Protection Agency, 1989).

High-grade (Ledger) Paper

Paper of high value, such as computer printout, white ledger, and tab cards. High-grade paper can also refer to industrial trimmings at paper mills that are recycled (Environmental Protection Agency, 1989).

Inorganic Waste

Waste composed of matter other than plants or animals and containing no carbon (Environmental Protection Agency, 1989).

Intrinsic Incentive

Intrinsic incentives motivate people to perform activities based on personal satisfaction without the promises of tangible returns (DeYoung, 1985).

NIMBY

NIMBY is an acronym for "Not In My Back Yard," and is an expression of resident opposition to the siting of a facility in a particular proposed location (Environmental Protection Agency, 1989).

Non-users

Non-users are Owasso residents who were defined as recyclers but have never heard of the ORC.

Organic Waste

Waste material of municipal solid waste includes paper, wood, food waste, plastics, yard waste and that contain carbon (Environmental Protection Agency, 1989).

Prompts

Includes a written or oral request asking residents to participate in the recycling program basically because it is the ecological thing to do. (Witmer and Geller, 1976)

Recyclables

Recyclables are materials that still have useful physical or chemical properties after serving their original purpose and that can, therefore, be reused or remanufactured into additional products (Environmental Protection Agency, 1989).

Recycling

The process by which materials otherwise destined for disposal are collected, reprocessed or remanufactured, and reused (Environmental Protection Agency, 1989).

Tipping fee

A fee, usually dollars per ton, for the unloading or dumping of waste at a landfill, transfer station, recycling center, or waste-to-energy facility, usually stated in dollars per ton; also called a disposal or service fee (Environmental Protection Agency, 1989).

Waste Reduction

Sometimes used synonymously with source reduction, waste reduction is reducing the amount or type of waste generated (Environmental Protection Agency, 1989).

White Goods

Large household appliances such as refrigerators, stoves, air conditioners, and washing machines (Environmental Protection Agency, 1989).

Yard Waste

Leaves, grass clippings, prunings, and other natural organic matter discarded from yards and gardens. Yard waste may also include stumps and brush, but these materials are not normally handled at composting facilities (Environmental Protection Agency, 1989).

APPENDIX B
THE OWASSO RECYCLING
TELEPHONE SURVEY

**THE OWASSO RECYCLING
TELEPHONE SURVEY**

TELEPHONE # _____

IF A SMALL CHILD ANSWERS:

"Could I please speak to an adult in your home?"

STATEMENT:

"Hello, my name is _____. I am conducting a recycling survey for the City of Owasso and Oklahoma State University. Could you give me a few minutes of your time to answer some general questions about recycling?"

IF NO:

"May I contact you another time at your convenience?"

Yes, When? _____ No

(If No: "Sorry to have bothered you.")

(If Yes: I will try to contact you at or during _____. Thank you for your cooperation.)

IF YES:

"Are you or do you consider yourself, an Owasso resident?"

Yes No

(If No: "This survey includes only those within the Owasso Community. On behalf of OSU and the City of Owasso we thank you for your cooperation.") (If Yes: BEGIN WITH QUESTION ONE)

(1.) In the last year, which of the following household wastes, if any, have you recycled?

- | | | |
|------------------------------------|---------------------------------------|-----------------------------------------|
| <input type="checkbox"/> glass | <input type="checkbox"/> plastic | <input type="checkbox"/> used motor oil |
| <input type="checkbox"/> aluminum | <input type="checkbox"/> office paper | <input type="checkbox"/> batteries |
| <input type="checkbox"/> newspaper | <input type="checkbox"/> cardboard | <input type="checkbox"/> nonrecycler |
| <input type="checkbox"/> magazines | <input type="checkbox"/> steel cans | |

(2.) On average, which of the following indicate how often you separate your recyclable material from your trash?

- | | |
|----------------------------------------------|------------------------------------------------|
| <input type="checkbox"/> several times a day | <input type="checkbox"/> quarterly |
| <input type="checkbox"/> daily | <input type="checkbox"/> a couple times a year |
| <input type="checkbox"/> weekly | <input type="checkbox"/> once a year |
| <input type="checkbox"/> monthly | <input type="checkbox"/> nonrecycler |

(3.) In the future do you plan to:

- | | |
|------------------------------------------------------------------|----------------------------------------|
| <input type="checkbox"/> increase your recycling efforts | <input type="checkbox"/> Never recycle |
| <input type="checkbox"/> decrease your recycling efforts | <input type="checkbox"/> I don't know |
| <input type="checkbox"/> maintain your current recycling efforts | |

(4.) I am going to read you a few statements regarding reasons why you may recycle. Please indicate the degree to which they apply to you by stating whether you STRONGLY agree, agree, disagree, STRONGLY disagree, or none of the above.

[1=strongly agree 2=agree 3=disagree 4=strongly disagree 5=none of the above]

- 1 2 3 4 5 I recycle to help conserve natural resources
- 1 2 3 4 5 I recycle to help support charity
- 1 2 3 4 5 I recycle to earn money
- 1 2 3 4 5 I recycle because it seems like the right thing to do
- 1 2 3 4 5 I recycle to preserve the environment

(5.) The rest of the statements are reasons that may discourage from recycling. Please indicate the degree to which they apply to you by stating whether you **STRONGLY** agree, agree, disagree, **STRONGLY** disagree, or none of the above.

[1=strongly agree 2=agree 3=disagree 4=strongly disagree 5=none of the above]

- 1 2 3 4 5 Recycling is too much of a hassle
 1 2 3 4 5 There is not enough room to store the recyclables in my household
 1 2 3 4 5 There is not enough time to sort all the recyclables
 1 2 3 4 5 The recycling causes messiness around the house
 1 2 3 4 5 Recycling is not worth the money
 1 2 3 4 5 There is no recycling facility/pick-up service available
 1 2 3 4 5 I simply forget to recycle
 1 2 3 4 5 I don't know just how to recycle

(6.) Have you heard of the Owasso Recycling Center?

Yes No

(IF NO, GO TO QUESTION 11)

(7.) If so, from which of the following source(s) did you hear about the Center?

<u>Sources</u>	<u>Answers</u>	
Newspapers	Yes	No
Mailing	Yes	No
Friends	Yes	No
Family	Yes	No
School	Yes	No
Radio	Yes	No
Television	Yes	No
Work	Yes	No
Posters	Yes	No
Newsletters	Yes	No

(8.) Do you know where the Owasso Recycling Center is located?

Yes No

(9.) Have you taken recyclable materials to the Owasso Recycling Center?

Yes No

(10.) Which of the following materials do you BELIEVE are currently recycled at the Recycling Center.

<u>Materials</u>	<u>Answers</u>		
Glass Containers	Yes	No	Not Sure
Other (Plate) Glass	Yes	No	Not Sure
Newspaper	Yes	No	Not Sure
Cardboard	Yes	No	Not Sure
Magazines	Yes	No	Not Sure
Office Paper	Yes	No	Not Sure
Aluminum Cans	Yes	No	Not Sure
Other Aluminum	Yes	No	Not Sure
Rubber tires	Yes	No	Not Sure
Tin Cans	Yes	No	Not Sure
Plastic	Yes	No	Not Sure
Batteries	Yes	No	Not Sure
Used Motor Oil	Yes	No	Not Sure
Used Antifreeze	Yes	No	Not Sure

(11.) (IF DON'T KNOW, ASK) What is your sex?

Male Female

(12.) What year were you born? _____

(13.) How many people live in your household?

one four seven
 two five eight or more
 three six

(14.) Who collects your trash?

- The City of Owasso Yourself
 A private Hauling Service or, I'm Not Sure

(15.) Please estimate how far you live from Owasso City Hall (located downtown Owasso).

- less than 1 mile 11-15 miles
 1-5 miles 16-20 miles
 6-10 miles more than 20 miles

(16.) Please stop me when I have read the category which best fits the highest level of education you completed?

- Presently attending High School
 Attended High School, but did not graduate
 Graduated from High School
 Attended a Trade/VoTech School
 Graduated from a Trade/VoTech School
 Attended College, but did not graduate
 Graduated from College
 More than College degree: _____

(17.) On our final question, please stop me when I have read the category which best fits your household income before 1991 income taxes.

- less than \$15,000 \$35,000-45,000 \$65,000-75,000
 \$15,000-25,000 \$45,000-55,000 \$75,000 -85,000
 \$25,000-35,000 \$ 55,000-65,000 \$85,000 or more

(18.) "Do you have any comments you would like to make relating to recycling or recycling in your community?"

APPENDIX C
RECYCLING COMMENTS FROM
THE OWASSO RESIDENTS

TABLE XXIII
COMMENTS FROM RESIDENTS ABOUT
RECYCLING AND THE ORC

Comments	Number of Comments
The City of Owasso needs curbside recycling; would like a more convenient method of recycling, needs a pick-up service.	47
The residents of Owasso need more information; what is accepted at the ORC, more awareness about recycling and why certain recyclable materials are not taken (grocery bags), new residents should be told about the ORC, what are the hours of operation, where the ORC is located, why people should recycle, etc...	35
The City of Owasso is doing a great job with the ORC, and the ORC is a good program for the Owasso Citizens.	17
The recycling program needs to be more convenient; needs more recycling facilities available, provide containers for recyclables, desire a curbside or pick up service, would do more if it were easier, needs better streets leading to the ORC, not enough room to store my recyclables.	16
Enthusiastic comments about the importance of recycling and how everyone should do it.	15
The ORC should accept plastic.	7
The ORC should accept more types of recyclable materials; hope they expand, needs to do more.	6
Recycling should be mandatory.	4
The bags for the yard waste program are too expensive.	3
The ORC should accept scrap metal and steel cans.	2
The ORC should accept magazines.	1
The ORC should accept tree limbs.	1

TABLE XXIII (Continued)

Comments	Number of Comments
No Curbside Program; recycling should be a voluntary activity only.	1
Concerned that the recyclable material collected at the ORC is landfilled and not recycled.	1
Need a free landfill in Owasso.	1
The city should provide tax credit for businesses with recycling programs, or maybe a discount on utility fees; discounts for residents.	1
The Owasso High School should use something other than styrofoam in the cafeteria.	1
The construction and building around the Owasso area is a mess--they need to pick up their trash.	1
Corporations need to supply recycling incentives and should have deposits.	1
Why are there no deposits on bottles and cans?	1
Please recycle at Baptist Village...it would be worth while.	1
Will the public know the results of this survey?	1
Should not charge for things which can be recycled.	1

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