Public Perceptions and Practices of Recycling in the City of Laramie in Wyoming

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Abstract

Managing household solid waste is an urban problem in recent years. To tackle this problem, recycling is one of the most effective methods applicable in waste management. Recycling in the city of Laramie in Wyoming has a history that dates to 1983 with the establishment of Ark Recycling center. Laramie officially started its curbside recycling services in September 2011 and In April 2012, the city declared its long-term goal to achieve 40% diversion rate by 2030. The study involved a mail-back survey to understand public participation landscape and factors affecting recycling behaviors and attitudes of residents in Laramie. Quantitative result of the survey responses, civic engagement score, recycling importance score recycling satisfaction and recycling behavior scores were created to understand these attributes. In addition, three key informant interviews were conducted to explore efforts of the city, the University of Wyoming and the Ark Regional Services. Findings of the study show that more than 80% of the survey respondents indicated environmental concern was the major motivation to join recycling with high level of recycling importance and satisfaction. The Study further uncovered hints that Laramie needs to introduce an aggressive educational policy, incentive policies and a Master Plan to meet its 40% waste diversion rate by 2030 by maintaining stronger public participation in its planning process and community outreach programs.

Keywords: recycling; public participation; public perception; recycling behavior; environment

1. INTRODUCTION

Management of household waste has been a critical issue for urban areas in recent years. Recycling is one of the most practiced waste management procedures (Tchobanoglous & Kreith, 2002) to address the issue. Recycling includes the methods of separating, collecting and reprocessing or converting used or waste products into new materials (EPA, 2010). This is a general practice in many parts of the world at different levels, including the United States. The level of public participation and the nature of programs may vary. Many factors may influence the recycling programs in different locations. Some of these factors are-- public participation, recycling behaviors and attitudes, and the role of regulatory structure (Cochran et al., 2007). Public engagement has been realized as a critical to build a successful recycling program. Residents should be engaged in the planning and pre-implementation to help them understand of why the program is needed, how it will benefit them, and sustained participation and ownership to the program (Lansana, 1993). It also gives an opportunity to all the stakeholders to discuss unseen problems with possible solutions, create a public consensus on issues, and uphold with their commitment to the project (Salleh 2009). A study on solid-waste recycling observed that cities with higher rates of participation in recycling placed a greater emphasis on citizen involvement during their planning process (Folz, 1991). In an ideal situation, citizens participate in the program initiation, policy formulation and decision-making process (Irvin & Stansbury, 2004). When people are personally involved in the policy formulation and decision-making processes, they are motivated to lead the programs to success (EPA 2013).

Demographic factors such as gender, age, income, and education of an individual have been noticed to be influencing recycling participation. When analyzing the role of gender in relation to recycling participation, women seem to be active in household recycling. The study by Meneses and Palacio (2005) discuss that women are more likely to be engaged in household recycling than their male counterparts. This view is supported by Arcury, Scollay, and Johnson (1987) stating that women, due to traditional gender roles associated with their household activities, are more likely to be involved in recycling activities. Another notable factor affecting participation is the age of people living in a community. It has been reported that older people with age of forty or above are more likely to participate in recycling than their younger counterparts (Scott 1999; Saphores et al., 2006). However, there is a conflicting relationship between the level of education and recycling participation. For example, Sidique et al. (2010) observed that people with a higher level of education and income are likely to get engaged in recycling activities, whereas, Gamba (1994) and Meneses and Palacio (2005) concluded that the level of education of a person has very little influence on recycling participation.

Individual motivation, attitude and behavior also might play an important role in making the recycling programs successful. Studies of recycling during 1980s and 1990s, focused on the individual/family level using an applied behavior and attitude analysis (Schultz, Oskamp, & Mainieri, 1995). In this method, a prior commitment to participate in recycling programs is obtained from the interested individuals. Data from those studies indicated that a prior commitment to recycling resulted in higher level of public participation (Burn & Oskamp, 1986). However, more recent research findings on recycling behavior and attitude suggest that convenience, level of satisfaction toward recycling services, and economic incentives also influence individual behavior and attitude toward recycling program. For example, convenience factors such as proximity to a drop off center and frequency of collection services are strong predictors of recycling behavior and attitude (Omran et al., 2009; Sphores et al., 2006). Likewise, economic incentives such as rebates from containerized beverage deposits or money saved from costs of recycling disposal bring positive behavior and attitude in city dwellers (Viscue et al., 2011).

The other important factor to encourage recycling participation can be the enforcement of the regulatory structure. Regulatory structure such as mandatory recycling requires residents to comply with disposal controls, material recycling requirements, and recycling goals of the city or the state (Towensend et al., 2001). These regulations come into effect once the cities or states establish ordinances. The mandate is usually enforced by city garbage pick-up crews or by the city inspectors (Department of City and County of San Francisco, 2010). The other important policy to motivate recycling is the

establishment of an educational policy in recycling ordinances. This policy spreads awareness about the importance of recycling and educates public about its methods and procedures. Recently, many cities have started conducting door-to-door outreach programs to encourage recycling (EPA, 2010). One of such massive awareness programs is launched by the City of Boulder since 2006 in partnership with the University of Colorado at Boulder, that helped the city to reach 48% diversion rate, double the state average (The Boulder Stand, March 3, 2010).

While there are regulations, policies, and laws concerning recycling, there is still a great deal of variation in local recycling programs based on local contexts and priorities. The city of Laramie in Wyoming has a recycling history that dates to 1983 with the establishment of the Ark Regional Services, a non-profit organization. During that time, Ark started recycling in Laramie to create job opportunities for persons with disabilities. The service was limited to certain parts of the city. It was not until May 17, 2011 that the Laramie City Council approved an Ordinance (No. 1811 (A), 2011) that established its official curbside recycling program as per its Comprehensive Plan 2007. In April 2012, the city announced its long-term goal to reach 40% diversion rate by 2030 to reflect its commitment to recycling (University of Wyoming Sustainability Talk Series, 2012). Given this context, the purpose of this study is to understand the effectiveness of the City of Laramie's current solid waste management landscape using three major themes: understanding the public participation in the recycling planning process in Laramie, analyzing the factors affecting individual recycling behavior and attitude of the residents via a survey and highlighting the recycling efforts of key stakeholders via key informant interviews. Using these three major dimensions as the basis for examining recycling in Laramie, this study aims to evaluate potential opportunities and barriers and eventually recommend policies to achieving city's 2030 recycling goal. This paper focuses on site and situation, data collection method, results and discussion, recommendations, and conclusion of the study.

2. Background

Laramie is a growing city, located in Southeastern Wyoming (Figure 1) with a population of 32,081 in 2014 (U.S. Census Bureau, 2014). It is home to the University of Wyoming and serves as an access point to many outdoor recreation areas including the Snowy Range, the Medicine Bow-Rout National Forests and Vedawoo. People enjoy participating in recreation activities and, consequently, tend to care about preserving the environment. In addition, the city has one of the highest employment rates in the state with majority of people working in the academic sector (Wyoming Department of Workforce Services, 2014). As such, residents of Laramie tend to have high levels of education and are likely to respond favorably towards environmental protection. This was also evidenced in a recently conducted public forum in which a significant number of Laramie residents complained about possible harms to the environment caused by absence of glass recycling in the city (Glass Recycling Forum, 2013). The looming crisis of glass recycling occurred when the Ark Regional Services, the sole entity managing glass recycling, called off its services beginning November 2013.

Currently, there are three main stakeholders involved in recycling in the city. They include-- City Solid Waste Division, The University of Wyoming, and the Ark Regional Services. The composition of the city's current single-stream recyclable is 77% paper, 11% plastics, 6% metals, and 6% residue and others (Sustainability Talk Series, 2012). In the year 2012, the city reported that about 907 tons (7%) of total residential waste was recycled and sent to market (Personal Communication with City Solid Waste Manager, April 5, 2013). The collaboration of City Solid Waste Division, The University of Wyoming Recycling Program, and Ark Regional Services conducted an effective recycling program until the Ark called off its role for recycling due to imbalance of cost and revenue from cycling. Currently, rest of the two institutions are continuing the cycling program in Laramie.

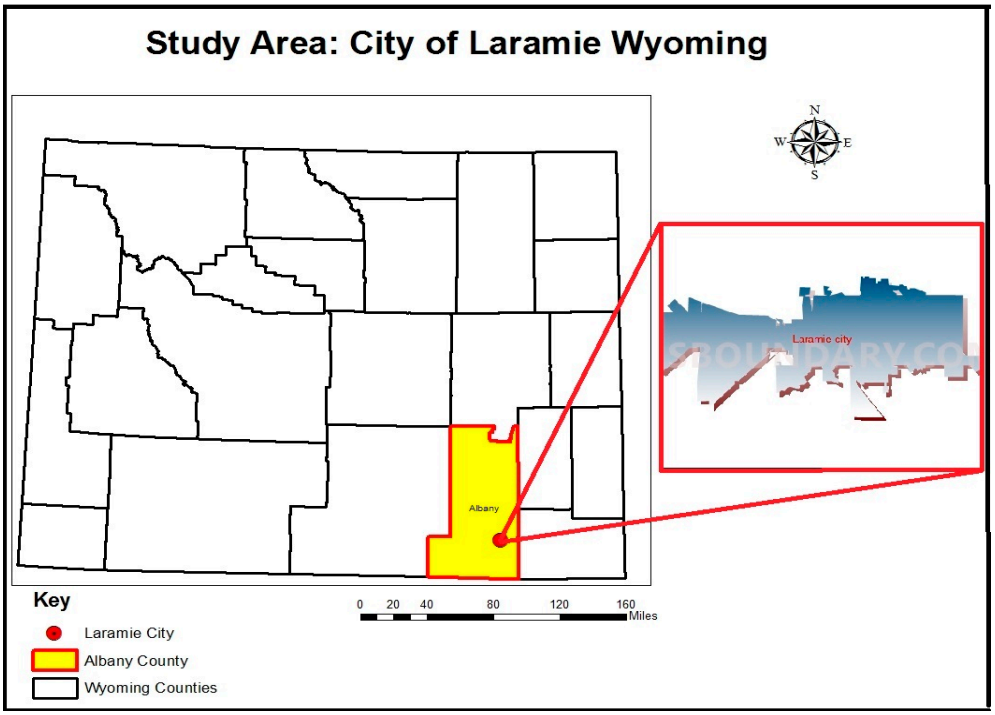

Figure 1. Location of the study area

The City of Laramie's recycling and diversion program recycled and diverted over 11.5 million pounds of materials in 2016 (www.cityoflaramie.org). The recycling products included single stream recycling (2,885,820 pounds), compost (7,900,000 pounds), tires 276,140 pounds, electronic waste 77,420 pounds, mulch 66,540 pounds, scrap metal 333,540 pounds, household hazardous waste 15,760 pounds, and auto batteries 13,000 pounds (City of Laramie, 2016).

2. Data Collection

In order to understand Laramie's recycling landscape, a survey was created and divided into three main sections. This tool was utilized in exploratory research design which in social sciences is a research framework conducted to obtain greater and deeper understanding of a phenomena (Stebbins, 2001). The first section included the information about the respondents' socio-economic data, such as years of residence in Laramie, persons per household, annual income, education level, profession, and age were collected to see if these attributes had any relation to their recycling participation and engagement. The second section included questionnaires to understand public participation and engagement in city's public gatherings and hearings, use of hotline to provide feedbacks and comments, attendance in planning meetings, and participation in public outreach and education in connection to recycling in Laramie. The third section of the survey included questions to understand the factors that affected residents' recycling behavior and attitude, specifically their motivation for recycling, importance to recycling and the level of satisfaction towards recycling services. The questionnaire used structured and semi-structured questions to address both quantitative and qualitative aspects of residents' perception and practice of recycling in Laramie.

Altogether 180 residents, 60 each from three council wards of the city were randomly selected using Excel program from approximately 10,000 residential home addresses obtained from the Albany County Assessor's office located in central Laramie. An equal number of respondents from each ward were considered to represent the population and to maintain homogeneity and neutrality in the analysis and interpretation of the study. A mail-back survey was sent to all the selected residential addresses (Figure 2). The response rate for the survey was 49.4% with 89 residents taking part. Among them, 30

respondents (33.71%) represented Ward number one, 31 (34.83%) represented ward number two, and 28 respondents (31.46%) represented ward number three, respectively. The non-response rate (50.6%) may have non-response bias if some non-responders had a different view compared to those who responded; in that case, the results of the survey would have been affected. However, in order to supplement the survey results and to highlight key stakeholders' recycling efforts in Laramie, three key informant interviews were conducted with the City Solid Waste Manager, the University of Wyoming Recycling Manager, and the Director of the Ark Regional Recycling Services, Laramie. These personal interviews were conducted on April 5, April 9 and April 18, 2013, respectively and each interview lasted for an hour. These interviews played an important role in providing in-depth information about the status of the recycling in Laramie.

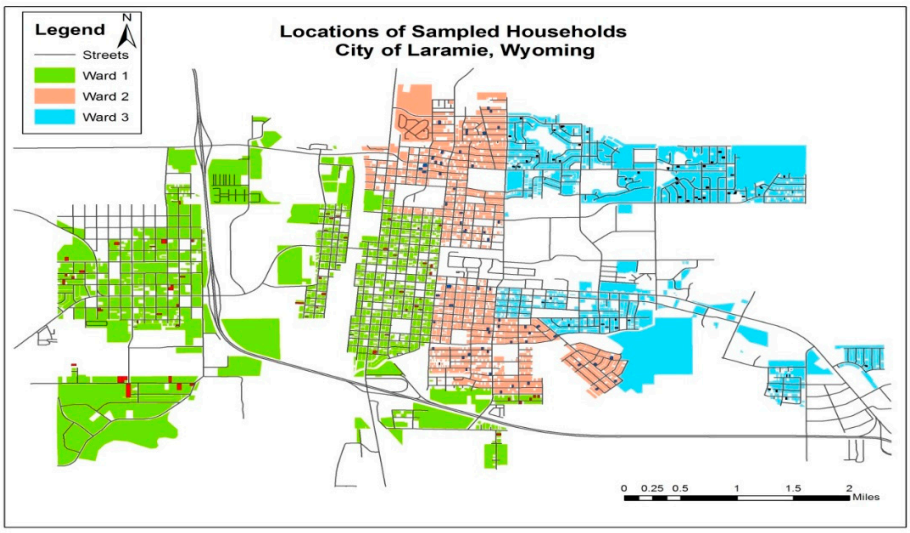

Figure 2. Distribution of Sampled Households

4. ANALYSIS, RESULTS, AND DISCUSSION

4.1. Public Participation: Civic Engagement Score

Public participation is considered a very important component in recycling programs. It includes a rigorous engagement of people from program initiation to implementation. Engagement of the public in the planning process ensures decisions to benefit both public needs and their preferences (National Planning Commission, 2013). In the context of Laramie, in order to understand respondents' level of participation and engagement, they were asked three questions: *a) Did you attend the city's public meetings and hearings conducted? b) Did you use public hotline to make comments about city's recycling planning process? And c) Did you attend any planning meetings of the city?* The responses to these questions were analyzed quantitatively with (Yes =2 and No=1). A cumulative civic engagement score for each respondent was calculated by summing up the ordinal values corresponding to their responses and dividing by six (the highest possible ordinal value that a respondent could achieve from the three responses) to obtain the minimum score of 0.5 and maximum of 1 (Figure 3).

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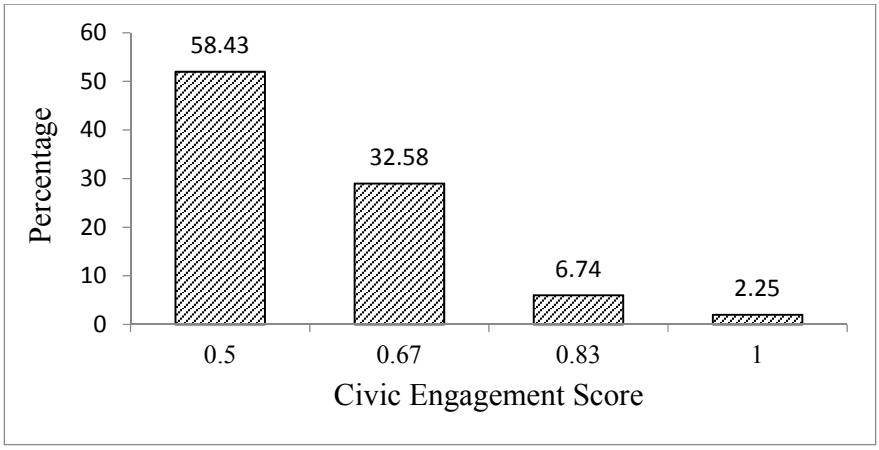

Figure 3. Distribution of Civic Engagement Score

Results show that the cumulative civic engagement scores in relation to public participation in pre-implementation phase of Laramie recycling are relatively low. Out of 89, fifty-two (58.43%) respondents scored 0.5 (the lowest possible score), only thirty-seven (41.57%) scored 0.67 or higher (Figure 3). The low scores of (<0.67) were affected by respondents' three levels of participation in the pre-implantation phase of recycling planning. First, it is because an overwhelmingly 81 out of 89 (92.14%) of the respondents never attended any public meetings and hearings in relation to the recycling program in Laramie. Only a very few, 7 respondents (7.87%), attended public meetings/hearings (Figure 4). Second, the survey results showed that approximately 2/3 of the respondents 75 out of 89 (66.29%) never used the city's hotline, and only about 1/3 (33.71%) of the respondents used the City Solid Waste Manager's office hotline allowing them to make comments and provide feedback about the city recycling program and services (Figure 5). The third important element affecting the civic engagement score was the respondents' low level of attendance in city's planning meetings. The results show only 1/3 of the respondents out of 89 participated in City Council's planning meetings (Figure 6)

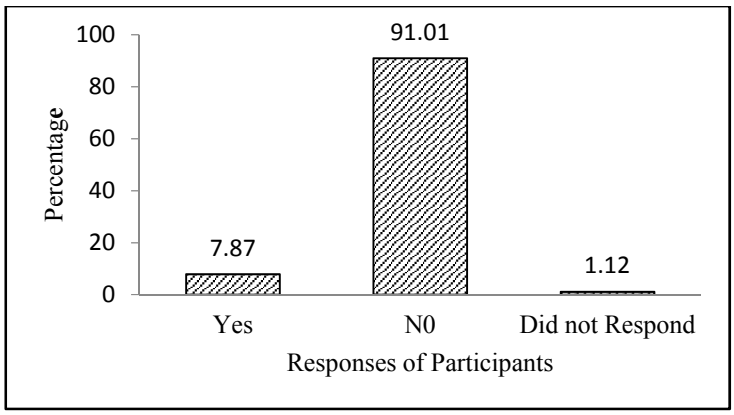

Figure 4. Attendance in public meetings and hearings.

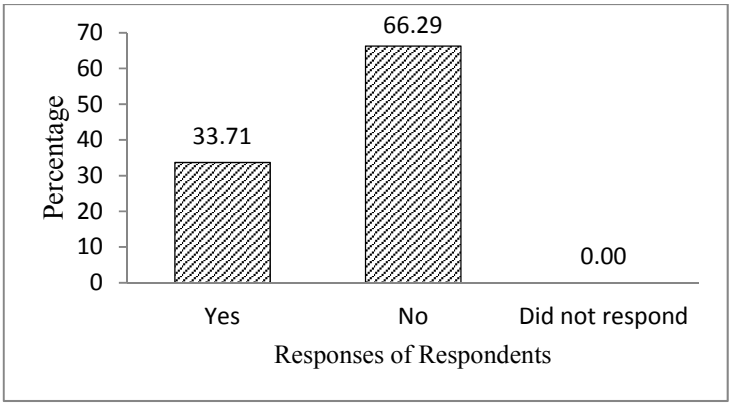

Figure 5. Use of public hotline

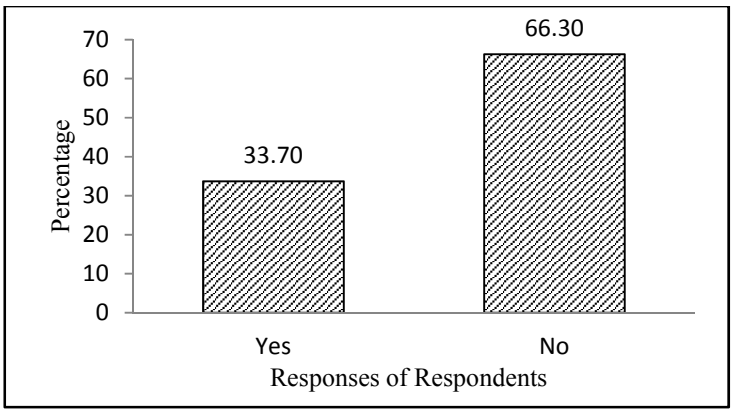

Figure 6. Involvement in planning meetings

Results discussed above suggest that the efforts to engage more citizens in pre-implementation phase of city's programs are to be prioritized. Their engagement is also necessary to develop a program with a greater level of public consent which should increase the likelihood of its success (O'Faircheallaigh, 2010). Active participation of citizens, especially during pre-implementation of programs, also helps in building consensus among policy-makers and the public to sketch out the possible ways to meet the program's goals and objectives in a desirable time-line (Kaltenborn et al., 2014).

4.2 Understanding Recycling Behavior and Attitude

There are many factors affecting individual recycling behavior and attitude. The most important elements include public's motivations for recycling and their level of satisfaction towards such services (Oskamp, 1995). In the context of Laramie, in order to understand the factors affecting individual behavior and attitude, respondents' motivation for recycling, cumulative recycling importance score, recycling satisfaction score and recycling behavioral scores were determined.

4.2.1 Motivations for Recycling

Motivation is one of the strong variables shaping recycling behavior (Peattie, 2010). Some of the important attributes affecting recycling behavior and attitude include environmental concerns,

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economic incentives, convenience, and influence of family and friends (Scott, 1999). In the case of Laramie, overwhelmingly, 84 out of 89 (94.38%) respondents expressed environmental concern (conserving natural resources and avoiding negative long-term impacts of landfill) as one of the most important factors motivating them to engage in recycling (Figure 7). This result may be because of residents' high level of concern for environmental sustainability of the city (Personal Communication with City Solid Waste Manager, April 5, 2013).

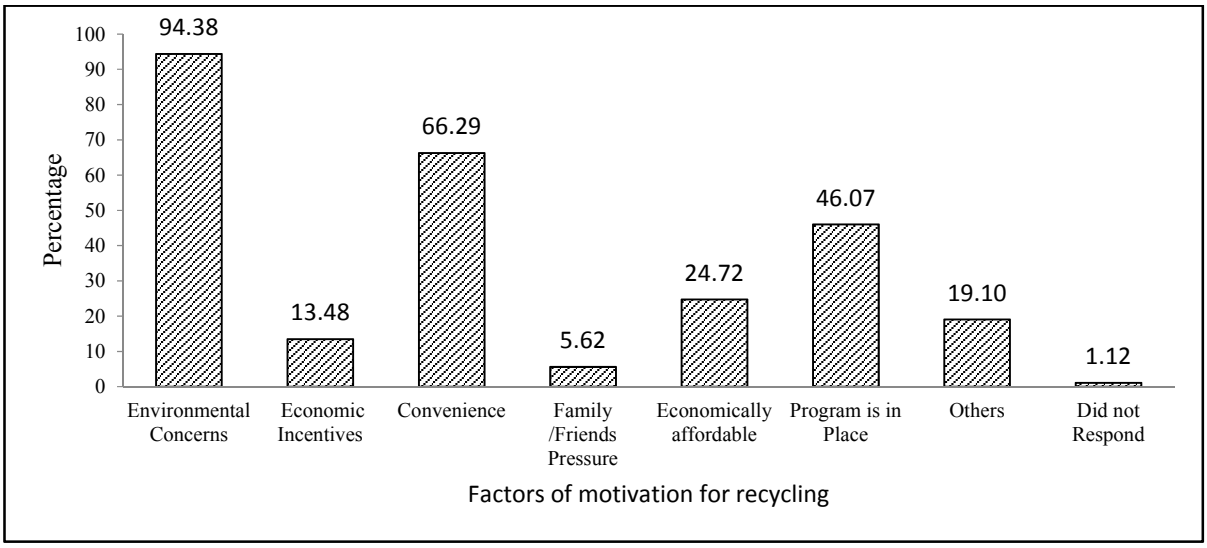

Figure 7. Motivations for Recycling

The above-mentioned results also agree with the study by Menesse and Palacio (2005) where they found a strong connection between environmental concerns and motivations for recycling. These results also agree with the survey conducted by Custom Research North America (CRN) in 2011 where 75% of the respondents expressed environmental concerns as their main motivation for recycling. However, motivation for recycling as a function of environmental concern may vary in relation to the education level of the people living in a particular community. Usually persons with low levels of education and lack of awareness are influenced by their friends and neighbors rather than environmental concern (OECD, 2008).

The second most noticeable reason for joining recycling programs for 59 out of 89 (66.29%) respondents was the convenience of city's curbside recycling program (Figure 7). Here, the convenience includes ease of managing household waste. The third most important motivation for joining recycling, 41 respondents (46.07%) expressed was to support the city's initiative since the program was in place and 22 (24.72%) respondents expressed economic affordability of the program encouraged them to join recycling. Only five (5.62%) respondents reported they were influenced by family and friends to participate in recycling. However, this number is low compared to the results of the survey done by Custom Research North America in 2011 in which 26% of the respondents were motivated by family, friends and neighbors to join recycling efforts in their communities (CRN Survey, 2011). Seventeen respondents (19.10%) stated other reasons such as a mandatory fee in their utility bill and the charitable nature of non-profits motivated them to join recycling (Figure 7).

4.2.2 Recycling Attitude: Recycling Importance Score

Residents' perception of recycling has a great role in determining their behavior and attitude towards its practice. In order to determine individual's behavior, it is necessary to understand their

beliefs, intentions, and the level of importance they give to recycling (Irvin & Stansbury, 2004). In this perspective, participants of the survey were asked two major questions to identify the level of importance and level of knowledge they had pertaining to recycling methods and procedures: a*) How important is recycling to you? and b) What is your level of knowledge about recycling methods and procedures?* The responses to the first question were quantified with Very important=5, Important=4, Neutral=3, Less important =2 and Don't Know =1. Likewise, the responses to the second question were quantified as Very knowledgeable= 5, Knowledgeable=4, Neutral=3, Less knowledgeable=2 and Don't Know= 1. A cumulative recycling importance score for each respondent was calculated by summing the ordinal values corresponding to their responses and dividing by maximum value of 10. The score results ranged between 0.5 and 1 (Figure 8).

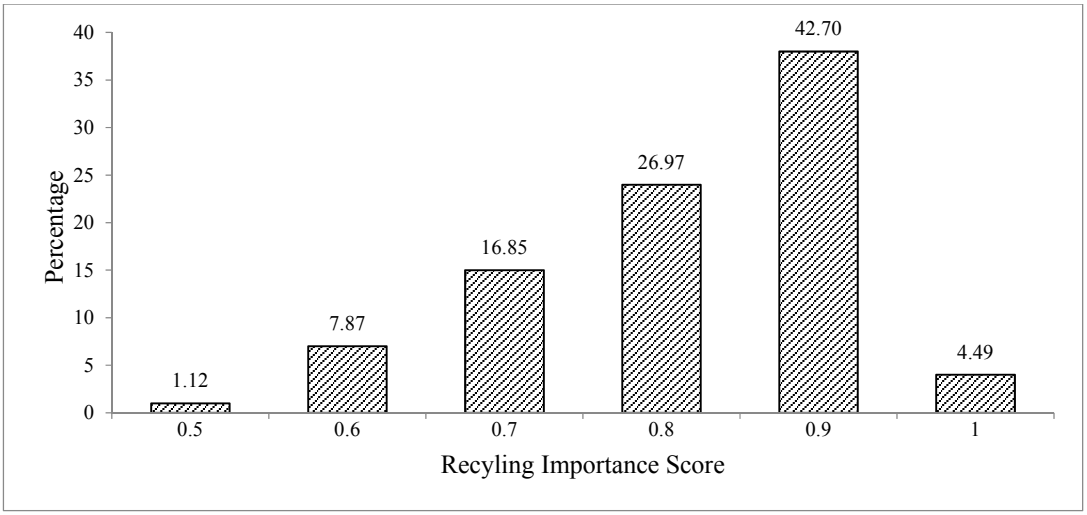

Figure 8. Distribution of Recycling Importance Score

Results of the analysis showed that more than 74.16% of the respondents received high scores of 0.8 and above (Figure 8). The majority of the respondents gave high-recycling importance scores as indicated by the fact that 86 out 89 (97%) expressed recycling as an important method to waste management, and only three residents (3%) had a neutral opinion to it (Fig. 9). Scott (1999) observed similar results in Ontario, Canada, perceived recycling as an important method to address the issue of solid waste management in their community.

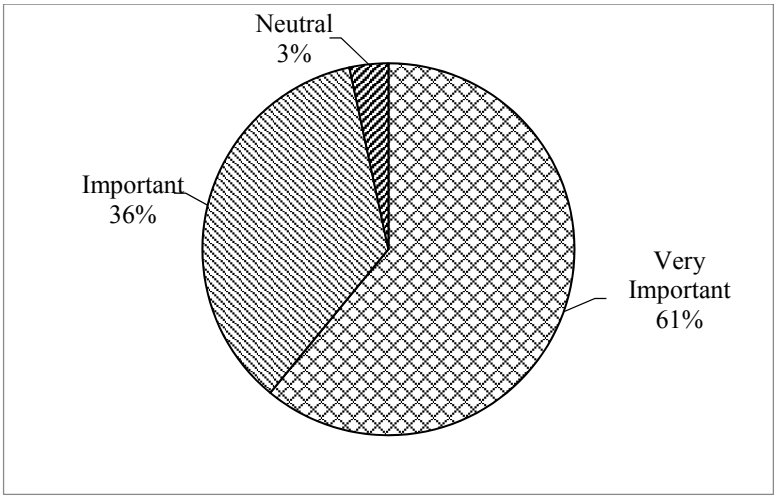

Figure 9. Respondent's Level of Importance to Recycling

Another reason for high-recycling importance scores is shown by 62 respondents (69.66%) indicating they were knowledgeable or very knowledgeable about recycling methods and procedures (Figure 10). Thus, evidence suggests most respondents in Laramie care about recycling and are motivated to be engaged in recycling with a high level of importance.

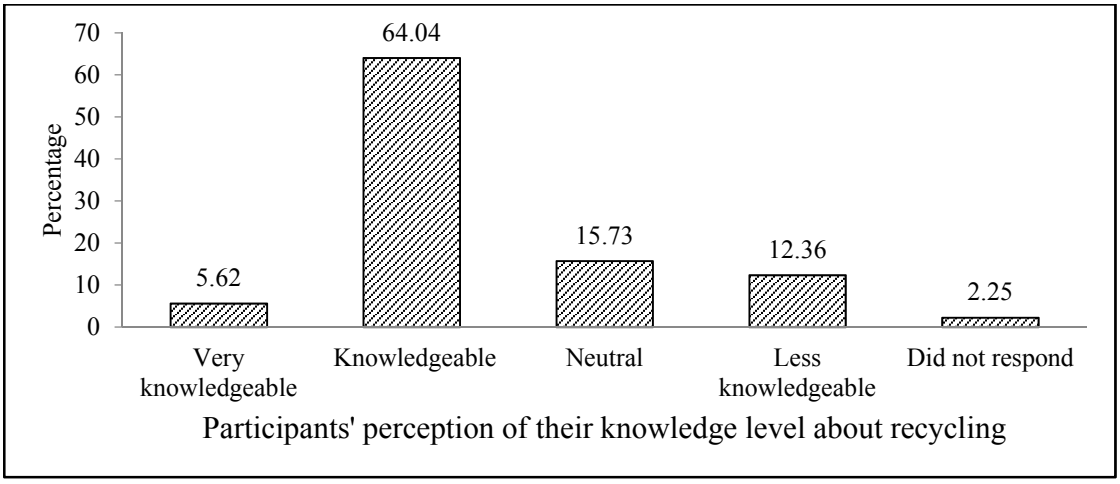

Figure 10. Level of knowledge on recycling methods and procedures

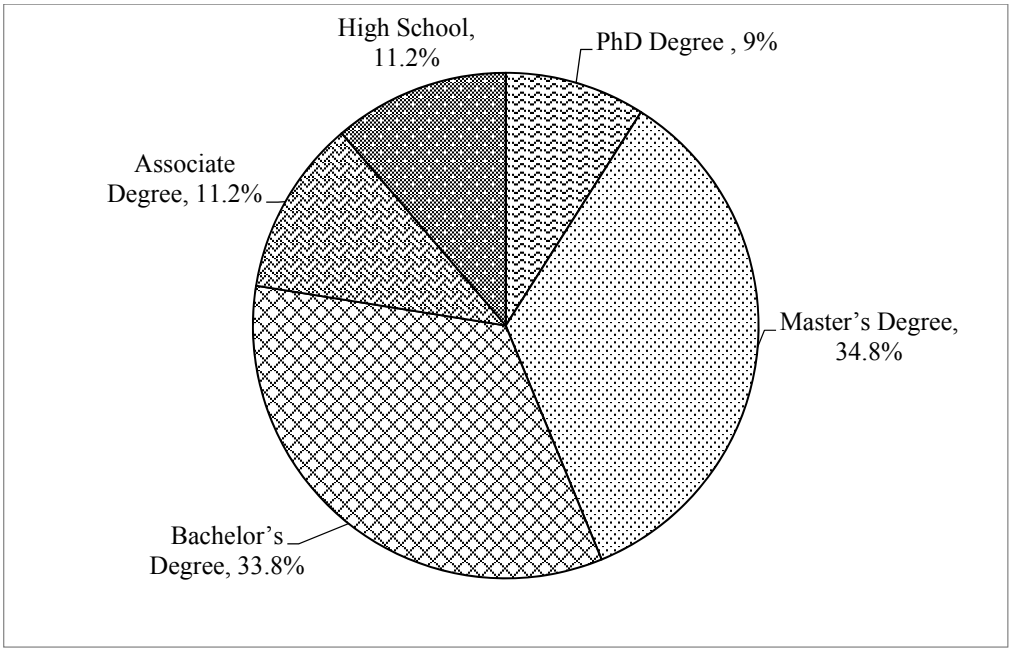

Figure 11. Respondents' Educational Level

Another contributing factor to high-recycling importance score results can be further tied to respondents' level of education, too. In this study, 77.6% of the respondents have received Bachelor's Degree level and above (Fig. 11). Studies suggest that people with high levels of education tend to know more about the benefits of recycling methods and procedures of a program, thus give high importance to it (Jenkins, Martinez, Palmer, & Podolsky, 2003).

4.2.3 Recycling Satisfaction: Recycling Satisfaction Score

Customer satisfaction is the top-most priority for many recycling service providers and is one of the driving forces for their success (US Hauling & Recycling Inc., 2014). In the case of Laramie, survey participants were asked the following questions to seek their levels of satisfaction towards city's services and facilities: *i) Are you satisfied with the frequency of recyclable collection service? ii) Are you satisfied with the size of the bin provided by the city? iii) What is your level of satisfaction towards number of recycling outreach educational programs? iv) What is your level of satisfaction towards public engagement in decision in relation to recycling planning process in the city?* Responses to these questions were quantified with five-point Likert scale of Very Satisfied=5, Satisfied=4, Neutral=3, Unsatisfied=2 Very unsatisfied=1. A cumulative recycling satisfaction score for each respondent was calculated by adding up ordinal values corresponding to their responses, dividing it by maximum value of 20. The scores results of 89 respondents ranged between 0.25 and 1.00 (Figure 12).

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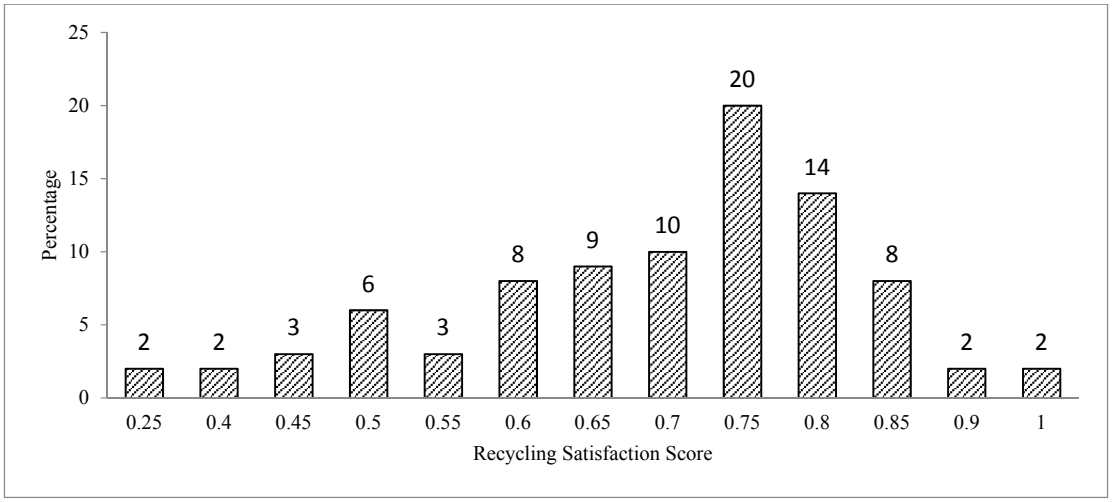

Figure 12. Distribution of Recycling Satisfaction Score

Results of analysis of recycling satisfaction score (RSS) showed that more than 2/3 of the respondents out of 89, secured scores 0.65 or higher (Fig.12). This result indicates that respondents were satisfied with current city's waste collection services and size of the bin provided for curbside recycling. However, they were not satisfied with public engagement in recycling planning process since 69 respondents (70%) indicate their neutrality or low levels of dissatisfaction towards it (Fig.13). This data suggest that the city needs to engage more people in its town-hall meeting for planning to receive feedback and to implement what most the people expect from city's recycling program.

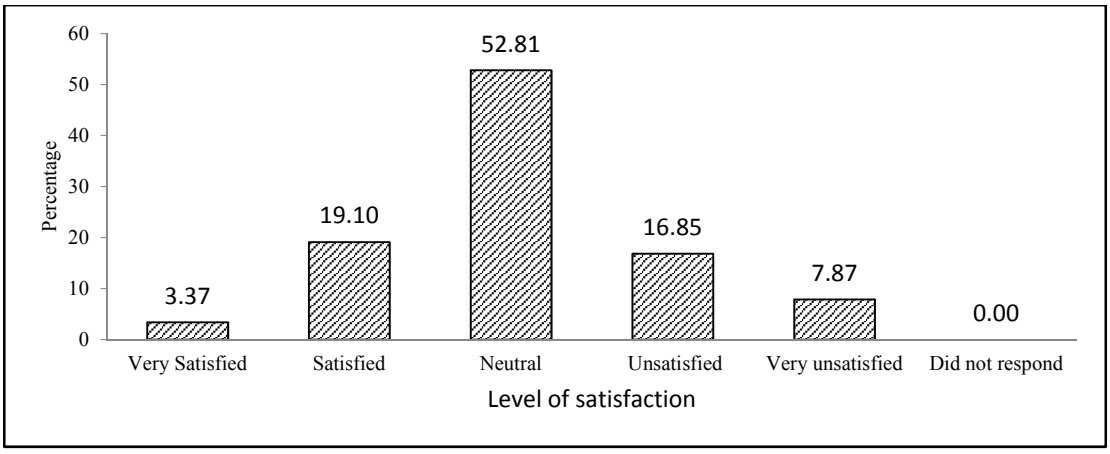

Figure 13. Level of satisfaction with recycling planning process

4.2.4 Recycling Behavior: Recycling Behavior Score

Recycling behavior score was determined to understand how frequently the respondents participated in recycling activities. This included their engagement in sorting recyclables at home and buying recycled materials from the market. To understand this issue, respondents were asked two questions: a*) How often do you recycle? b) How often do you buy recycled products? Responses to these questions were quantified with five-point Likert-scale: Every opportunity=5, Weekly =4 Monthly=2 and Never=1*. A cumulative recycling satisfaction score for each respondent was calculated by adding up

ordinal values corresponding to their responses, dividing it by maximum value of 10. Results of 89 respondents ranged between 0.40 and 1.00 (Fig.14).

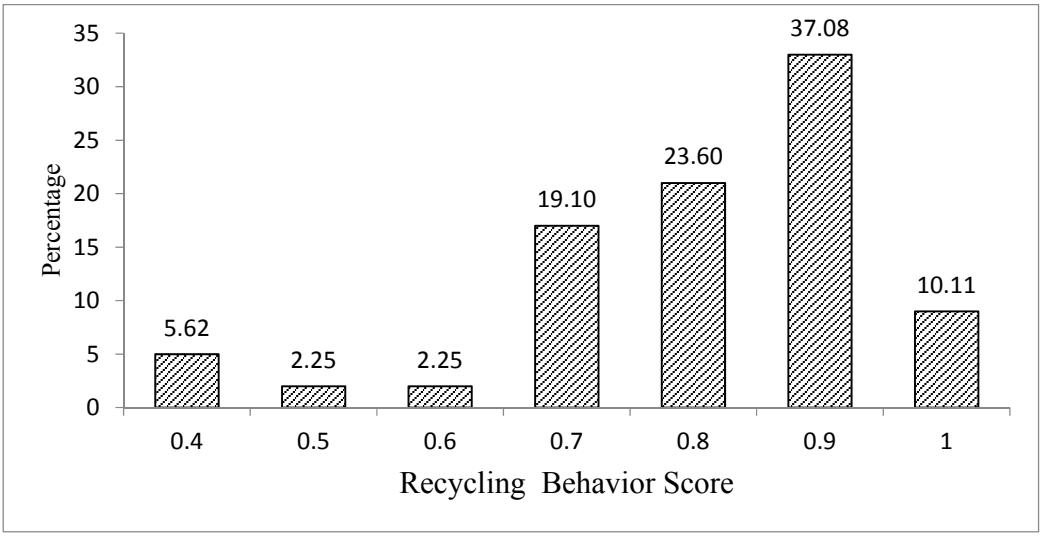

Figure 14. Distribution of Recycling Behavior Score

Analysis of the recycling behavior scores showed about 90% of the respondents obtained the score of 0.7 or higher (Figure 14). This finding is supported by the fact that overwhelmingly more than 2/3 of the respondents (71%) were engaged in recycling activities at every opportunity and 19.1% expressed they were involved once a week (Figure 15).

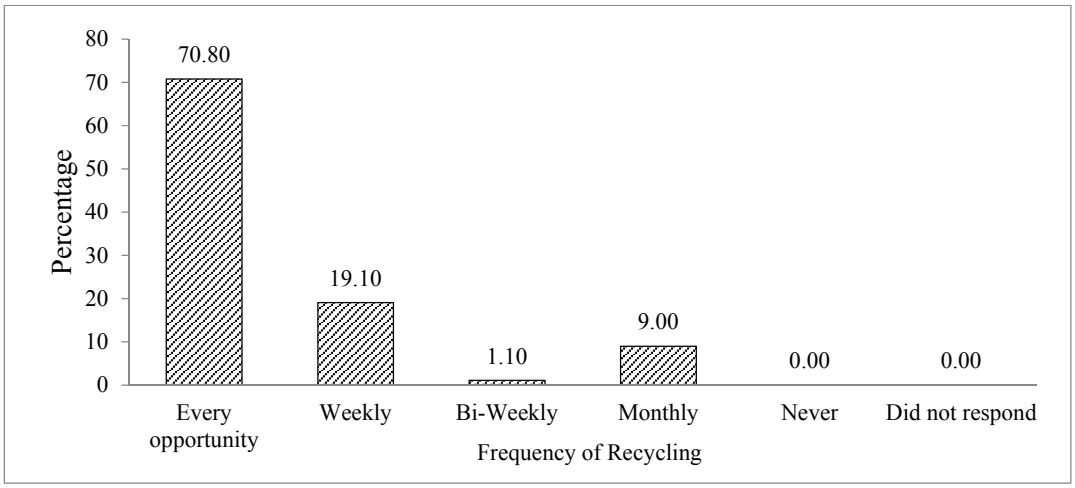

Figure 15. Frequency of Participants in Recycling Activities

4. Recycling Efforts in Laramie: Key Informant Interviews

One of the main reasons to conduct key informant interviews was to gain in-depth understanding of the current recycling landscape of Laramie through the efforts the key stakeholders. These included the City of Laramie Solid Waste Division, the University of Wyoming (UW) and the Ark Regional Services. Their current recycling status and efforts are described below.

4.3.1 City of Laramie Solid Waste Division

The city recycling service involves picking up single-stream recycling every other week, same day as trash day. Once the materials are taken to the landfill, recyclable materials are dumped inside a building, then compacted and finally put into a container. Once the container is full, it is hauled to Denver, Colorado, two times a week. The service fee for residents is $4.30 per bin per month, the fee being mainly appropriated for transportation and management. Volume of recycling materials collected in the City of Laramie has increased since the establishment of curbside recycling in September of 2011. It increased from 414 tons in 2011 to 1358.78 tons in 2012, that shows 228.21% increase in the first one year. The city is now averaging approximately 90 tons a month of single-stream recycling. This trend shows that Laramie's recycling rate is gradually increasing, but it has a long way to achieve its goal of a 40% diversion rate by 2030. The most common materials the city receives are paper products, fiber, cardboard, and newspaper. With respect to its immediate plan, the city solid waste manager mentioned that the city is investing approximately $7.0 million for a new landfill project with a bale facility building to bale trash and store higher volumes of recyclables (Personal Communication with City Solid Waste Manager on April 5, 2013).

The City Solid Waste Manage feels that educational policy is the most effective one for increasing recycling rates in Laramie. To meet this objective, he mentioned that the city is already working with elementary schools in a grassroots approach. He further recommended a pay-as-you-throw policy to be implemented in the city that may motivate people to recycle more with more economic incentives (Personal Communication with City Solid Manager, Laramie on April 5, 2013). This policy provides a direct economic incentive to residents in their waste disposal fee, which motivates them to recycle more and produce less waste for dumping (EPA, 2013).

4.3.2 The University of Wyoming Recycling Center

The University of Wyoming (UW) has been engaged in recycling for more than a decade with a recycling center established in its own premises. There are approximately 50 recyclable collection bins placed at different locations across the campus. The amount of recyclables increased from 396 tons in 2011 to 433.5 tons in 2012. Most the recyclables included paper, plastic bottles, aluminum cans, cardboards, brown glasses, clear glasses, newspapers, office junk mails, shred paper, steel cans, and white papers. The university's recycling is currently supported by the revenue obtained from the sale of commodities, student fee, and a contract with Pepsi, the sole provider of beverages on campus (Personal Communication with UW Recycling Manager on April 9, 2013). Besides, regular trash collection, the University also takes part in a nationwide recycling competition known as "Recyclomania." In 2013, the results of the competition placed UW in 130th place among 411 schools in which the participants of UW collected approximately 72 tons of recyclables from school premises in four months duration of the competition (UW Sustainability Report, 2013).

Immediate plans to improve recycling on campus include the warehouse building creating more space for storage. This new facility will be doubled of the size of the current facility in the future. Next, the University of Wyoming plans to work very closely with the City and Ark Regional Services to make recycling more convenient. With regards to new policy adoption, the UW Recycling Manager recommended mandatory recycling for all communities in Laramie. This includes all multi-housing units and commercial establishments across the city in addition to single-house family units (Personal Communication with UW Recycling Manager on April 9, 2013).

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Peer-reviewed version available at Recycling 2017, 2, 11; doi:10.3390/recycling2030011

4.3.3 Ark Regional Services

Another major stakeholder involved in recycling in Laramie was Ark Regional Services. It was a non-profit organization engaged in recycling for more than two decades and whose main objective was to create job opportunities for people with disabilities. In 2011, Ark collected approximately 4000 tons and that amount increased to 4500 tons in 2012. The primary recyclables Ark collected in 2012 were 50% (Newspaper/Magazines), 25% corrugated cardboard, 25% everything else (glass, plastic, steel, aluminum cans). The newspaper and magazines were sold to Idaho and Utah, where companies made insulation out those materials. The recyclable cardboard (1000 tons per year) was shipped to China. Revenues from these sales was approximately $100,000 per year. In addition to this, Ark also received funding from the state and federal agencies to support its recycling management (Personal Communication with Director of Ark Regional Services on April 18, 2013).

The immediate plan of Ark was to work with a statewide organization known as Wyoming Solid Waste and Recycling Association (WSWRA) to standardize recycling target rates in the state. The Director of Ark mentioned WSRA and Ark along with other non-profits organizations were trying to establish statewide policies to increase recycling rate in Wyoming. In this respect, the director of Ark Regional Services recommended statewide Bottle Bill, he thought that it would increase recycling rates of containerized beverages (Personal Communication with the Director of Ark Regional Services on April 18, 2013). Unfortunately, Ark Regional Services stopped its recycling services in Laramie since 2014.

4.4 Barriers to Recycling in Laramie

Though there is demand for new and renewed recycling efforts, there are also several barriers to such programs that must be considered. Usually, barriers to recycling include cost and the absence of economic incentives, lack of knowledge about programs, negligence and lack of awareness about environmental benefits of recycling (Werner et al., 1995). In the context of Laramie, 40 respondents (44.9%) participating in the survey of this study expressed public apathy as the key barrier to recycling in Laramie (Figure 16). This result is consistent with a general sentiment that the city has many wide-open spaces where residents can simply bury their waste (Personal Communication with the Director of Ark Regional Service on April 18, 2013).

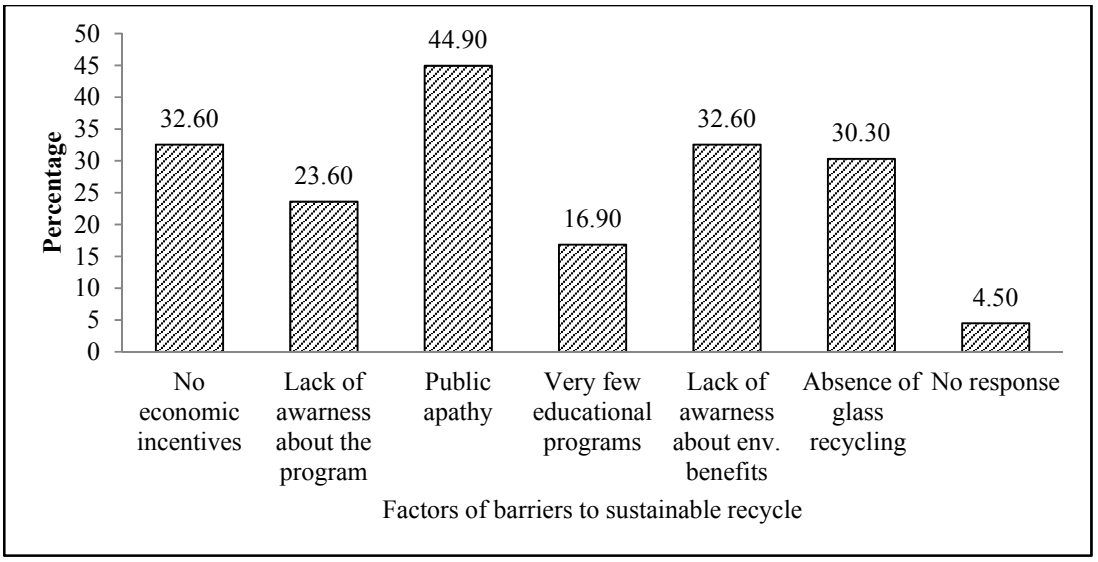

Figure 16. Barriers to Sustainable Recycling in Laramie

Another barrier to recycling in Laramie expressed by 29 respondents (32.6%) was absence of attractive economic incentives for residents to recycle. This result is meaningful since there is no incentive policies like "pay-as-you-throw," and no state wide Bottle Bill to reward recycling. The only economic incentive received by residents is the subsidized disposal fee established by the city and the Ark Regional Services (Personal Communication with the City Solid Waste Manager on April 5, 2013). If we look at the situation in Boulder, Colorado, one of the reasons for their growing recycling rates is establishment of pay–as-you-throw policy. In this policy residents pay less for garbage service by generating less waste to dump and more to recycle (Zero-Waste Master Plan, 2006).

A third important barrier to recycling identified by the respondents was the lack of awareness about environmental benefits of recycling. Twenty-nine respondents (32.6%) indicated increased knowledge regarding the environmental benefits of recycling would encourage more people to participate. Remaining problems include public idleness and absence of glass recycling, the lack of awareness and information about the program, and very few educational programs in the city (Figure 13).

While there are number of issues posing challenges to a successful recycling program, in addition to above mentioned barriers, the key informant interviews indicated that economic constraints were one of the most important barriers to recycling in Laramie. All the three key major stakeholders-- the City of Laramie, the University of Wyoming and Ark Regional Services, expressed the opinion that funding was the major problem inhibiting program effectiveness and sustainability. For example, the City Solid Waste Manager mentioned during the Glass Recycling Forum that cost of transportation for collecting recyclables within the city and transporting those to a recycling facility in Denver was very high and revenue obtained from the collection fee was just enough to support the cost of transportation. For this reason, the city was not able to carry out extensive door-to-door recycling campaigns or educational programs. With a similar perspective, the Manager at the University of Wyoming Recycling Centre and the Director of the Ark Regional Services felt that they did not have funding to conduct more events for recycling outreach and education (Personal Communication on April 9 and April 18, 2013, respectively).

Another barrier to recycling in Laramie expressed by the key informants was the citizens' attitude towards recycling and a general reluctance to change their attitude. Supporting this statement, the City Solid Waste Manager expressed his opinion that it was very difficult to persuade people to change their attitude and behavior in relation to effective recycling practice (Personal Communication on April 5, 2013). To add to this, the University of Wyoming Recycling Manager indicated that Wyoming culture was such that residents often did not like to be told what to do (Personal Communication on April 9, 2013).

5. RECOMMENDATIONS

Based on the findings and dicussion of the study, the following policies and strategies are recommended to the City of Laramie to increase its recycling rates to meet its 40% diversion rate by 2030.

5.1 Establishment of an Educational Policy

The City of Laramie should adopt an educational policy to educate residents about importance of recycling, its methods, and procedures. This can be done in several ways-- for example, through door-to-door campaigns, distributing pamphlets and posters during community meetings and events, increasing access to educational seminars for community members, creating special training packages for elementary and high school teachers, including recycling contest among students and collaborating with local newspaper to produce articles and advertisements. The city can also work more closely with the University of Wyoming to mobilize students and faculties in their educational outreach campaigns and to increase number of green events on and off campus.

5.2 Adoption of Recycling Ordinances and Incentive Policies

The city should consider mandating recycling for businesses and multi-unit housings. Additionally, the city can adopt a construction and demolition ordinance to divert such waste from the landfill, and create a special events ordinance requiring organizers and participants of the events to separate recyclables and non-recyclables. Finally, if feasible, the study recommends the City of Laramie to adopt a "pay-as-you-throw" policy and work with state legislators to create statewide Bottle Bill to increase recycling rates of containerized beverages by providing rebates and incentives to participants. However, it is to be noted that the state legislation of Wyoming has already rejected Bottle Bill three times.

5.3 Adopt Strategies to increase Public Participation in City's Planning Process

Referring to participants' low civic engagement scores and low level of satisfaction towards city's planning process, this study strongly recommends engaging a greater number of residents in the recycling process. Increased community engagement may lead to increased overall participation as well as to increased levels of satisfaction by creating strong consensus among policy makers and the public during the planning phase. Keeping these things in mind, public participation can be increased by conducting frequent public meetings and hearings, informing people via newspaper advertisements, radio announcements and conducting door-to-door outreach campaigns when possible.

5.4 Strategies to Reinstate Glass Recycling

In order to resume glass recycling in Laramie, this study recommends considering the ideas and suggestions discussed in the Glass Recycling Forum to generate funds. A key recommendation at the forum was increasing the recycling fee to cover the cost of transporting glass to the nearest recycling facility in Colorado. Another potential source of funds for the city could be creating opportunities for private sponsorship to place their advertisements on recycling bins. In conjunction with the above, a voluntary fee on the utility bill could also be used to help reinstate glass recycling in the city.

5.5 Developing a Master Plan

Based on priorities identified in the key informant interviews, the study highly recommends the city to partner with statewide agencies, non-profits and environmental groups to develop a Master Plan to create minimum annual recycling targets for each city in Wyoming including Laramie based on their population. This plan would eventually increase the state's overall recycling rate. In addition, the Master Plan should also focus on reducing and reusing paper products that comprises around 77% of total recyclables in Laramie.

6. CONCLUSION

Though changes cannot occur overnight, the results of this study show that there are many options that City of Laramie can take to consideration to increase its recycling rates. Citizen involvement is fundamental to this process. By fostering a sense of community purpose among Laramie residents, their views and attitudes about recycling can be focused toward sustainable community development and environmental conservation. Recycling, in its essence, is about old things becoming new. It is about possibilities to reuse materials and it is about safeguarding the environment. When community residents and government officials see the potential returns on investment in recycling, people tend to respond positively to the benefits both to themselves and their communities. By actively increasing and promoting its recycling program, the City of Laramie can reap many benefits recycling can provide.

Given the results of this study, the next task for the city is to develop creative ways to engage the residents in the recycling program. This process can be aided by working with local community groups, artists, businesses, school programs, and youth groups to integrate recycling themes into their events and to gather feedback directly about recycling initiatives in Laramie. Being a university town, the City of Laramie has a great potential to expand its educational efforts across the city. These efforts should be used to remind people of how recycling benefits them and their communities and likewise helping them become more knowledgeable about recycling methods and procedures. Consequently, people will better be able to see the positive results of their actions and will be more likely to continue those actions. Keeping people inspired, motivated, educated, and informed is essential to a successful long-term recycling program (EPA, 2013). After evaluating the three major policy evaluation criteria (i.e., administrative feasibility, political feasibility and economic feasibility), it can be concluded that Laramie needs to be deliberate in generating additional funds for implementing proposed educational and incentive policies to meet its long-term recycling goals to reach 40% diversion rate by 2030.

REFERENCES

Arcury, T.A., Scollay, S., & Johnson, T.P. (1987). Sex differences in environmental concern and knowledge: The case of acid rain. *Sex Roles*, (16): 463-472.

Bottle Bill Resource Guide. (2013). Bottle Bills in the USA. Retrieved on July 10, 2013 from http://www.bottlebill.org/legislation/usa.htm.

Burn, S. M., & Oskamp, S. (1986). Increasing community recycling with persuasive communication and public commitment. *Journal of Applied Social Psychology, 16*(1): 29-41.

Cochran, K., Henry, S., Dubey, B., & Townsend, T. (2007). *Government policies for increasing the recycling of construction and demolition debris*. Gainesvilla, FL: University of Florida.

Department of City and County of San Francisco. (2013). Strategies to address greenhouse gas emissions, found at http://www.sf-planning.org/ftp/files/MEA/GHG-Reduction_Rpt.pdf, retrieved on July 5, 2013.

Environmental Protection Agency. (2013). Introduction to the Resource Conservation and Recovery Act, http://www.epa.gov/osw/inforesources/pubs/orientat/rom1.pdf, retrieved on July 5, 2013.

Environmental Protection Agency. (2010). Municipal solid waste – recycling, wastes - resource conservation - Common Wastes & Materials - Paper Recycling, retrieved on April 15, 2012.

Environmental Protection Agency. (2010). A Report on solid waste generation, recycling and generation," http://www.epa.gov/osw/nonhaz/municipal/index.htm, retrieved on April 28, 2013.

Folz, D. H. (1991). Recycling program design, management, and participation: A national survey of municipal experience. *Public Administration Review, 51*(3), 222-231.

Gamba, J. R.(1994). Factors influencing community residents' participation in commingled Curbside Recycling Programs. *Environment and Behavior, 26* (5), 587-612.

Glass Recycling Forum. (2013). Laramie Glass Recycling Forum Summary. http://www.uwyo.edu/sustainability/_files/documents/laramie-glass-recycling-forum-summary.pdf, retrieved on December 10, 2013.

Jenkins, R. R., Martinez, S. A., Palmer, K., & Podolsky, M. J. (2003). The determinants of household recycling: a material-specific analysis of recycling program features and unit pricing. Journal of environmental economics and management, 45(2): 294-318.

Irvin, R. A., and Stansbury, J. (2004). Citizen participation in decision-making: is it worth the effort?. Public administration review, 64(1): 55-65.

Kaltenborn, B. P., Hongslo, E., Gundersen, V., & Andersen, O. (2014). Public perceptions of planning objectives for regional level management of wild reindeer in Norway. *Journal of Environmental Planning and Management*, (Online Published On April 10, 2014), 1-18.

Lansana, F. M .(1993). A comparative analysis of curbside recycling behavior in urban and suburban communities. *The Professional Geographer, 45*(2),169-179.

Meneses, G.D, & Palacio A.B. (2005). Recycling behavior: a multidimensional approach. *Environment and Behavior*, 37, 837-60.

Organization for Economic Cooperation and Development(OECD)(2008). Household behavior and the environment reviewing the evidence, OECD 1-264, found at http://www.oecd.org/environment/consumption-innovation/42183878.pdf, retrieved on December 10,2013.

O'Faircheallaigh, C. (2010). Public participation and environmental impact assessment: Purposes, implications, and lessons for public policy making. *Environmental Impact Assessment Review, 30*(1): 19-27.

Omran, A., Mahmoond, A., Adbul Aziz, H., & Robinson, G. M. (2009). Investing households attitude toward recycling of solid waste in Malaysia: A case study. *International Journal of Environmental Research, 3*(2): 275-288.

Oskamp, S. (1995). Resource conservation and recycling: Behavior and policy. *Journal of Social Issues, 51*(4),157-177.

Patton, C. V., Sawicki, D. and ClArk, J. (2013). Basic methods of policy analysis and planning (3rd ed). Upper Saddle River, N.J: Pearson.

Peattie, K. (2010). Green consumption: behavior and norms. Annual Review of Environment and Resources, 35(1): 195.

Personal Communication, Laramie City Solid Waste Manager, April 5, 2013.

Personal Communication, University of Wyoming Recycling Manager, April 9, 2013.

Personal Communication, Director of ARK Regional Services, April 18, 2013.

Stebbins, R. A. (Ed.). (2001). *Exploratory research in the social sciences* (Vol. 48). Thousand Oaks, CA: Sage Publications.

Salleh, D. (2009). *Critical success factors of project management for Brunei construction projects: Improving project performance*. Unpublished PhD Dissertation. Faculty of Built Environment

and Engineering, Queensland University of Technology. (eprints.qut.edu/au/38883; Accessed July 10, 2013).

Saphores, J. M., Nixon H, Ogunseitan O.A., Shapiro, A. A. (2006). Household willingness to recycle electronic waste: an application to California. *Environment and Behavior, 38*, 183–208.

Schultz, P., Oskamp, S., & Mainieri, T. (1995). Who recycles and when? A review of personal and situational factors. *Journal of environmental psychology, 15*(2), 105-121.

Scott, D. (1999). Equal opportunity, unequal results: determinants of household recycling intensity. *Environment and Behavior, 31*, 267-90.

Sidique, S. F., Lupi, F., & Joshi, S. V. (2010). The effects of behavior and attitudes on drop-off recycling activities. *Resources, Conservation and Recycling*, 54(3), 163-170.

Sustainability Talk Series. (2012). Where Does Laramie's Waste Go? April 18, 2012. Sustainability Report (2011). Sustainability report summary. Retrieved on April 12, 2012 from: http://www.uwyo.edu/sustainability/_files/documents/2010-2011csc-progres-%20report-final.pdf.

Tchobanoglous, G., & Kreith, F. (2002). Handbook of solid waste management. New York: McGraw-Hill.

The Boulder Stand, Boulder. (2011). Boulder leads in recycling but Colorado is Catching On http://www.theboulderstand.org/2011/12/26/boulder-leads-in-recycling-but-colorado-is-catching-on/ retrieved April, 24, 2012.

U.S. Census Bureau. (2010), Quick facts. Retrieved on August 25, 2012 from: http://quickfacts.census.gov/qfd/states/56/5645050lk.html.

Viscusi, W. K., Huber, J., & Bell, J. (2011). Promoting recycling: Private values, social norms, and economic incentives. *The American Economic Review*, 101(3): 65-70.

Werner, C. M., Turner, J., Shipman, K., Shawn Twitchell, F., Dickson, B. R., Bruschke, G. V., & von Bismarck, W. B. (1995). Commitment, behavior, and attitude change: An analysis of voluntary recycling. *Journal of Environmental Psychology*, 15(3), 197-208.

Wyoming Department of Work Force Services. (2014). Wyoming Workforce Annual Report, found at http://doe.state.wy.us/lmi/annual-report/2014-Annual-Report.pdf, retried on July 10, 2014.

Zero-Waste Master Plan. (2006). City of Boulder Master Plan for Waste Reduction, found at https://www-static.bouldercolorado.gov/docs/zero-waste-reduction-master-plan-1-201305071148.pdf, retrieved on July 15. 2013.