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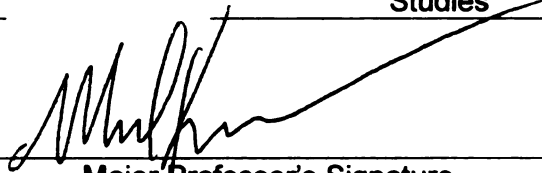
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**COMMUNICATING WITH STAKEHOLDERS AND ACCOUNTING FOR THEIR
WORLDVIEWS IN PROMOTING SUSTAINABILITY AT MICHIGAN STATE
UNIVERSITY**

By

Felix Kwame Yeboah

A THESIS

**Submitted to
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ABSTRACT

COMMUNICATING WITH STAKEHOLDERS AND ACCOUNTING FOR THEIR WORLDVIEWS IN PROMOTING SUSTAINABILITY AT MICHIGAN STATE UNIVERSITY

By

Felix Kwame Yeboah

This thesis is built around two essays based on data collected as part of efforts to promote sustainability at Michigan State University [MSU]. The first essay focuses on survey results concerning communication strategies to help develop an effective recycling program publicity campaign for MSU. It examines the relative attractiveness and perceived efficacy of available communication media as well as the information needs of three stakeholder groups regarding a new recycling initiative. The results suggest that communication efforts for promoting recycling programming should focus more on messages concerning *what*, *how*, and *where* to recycle. Also, that recycling publicity efforts should differentiate the mode and content of communications based on target audience. The second essay seeks to better understand the appropriateness of a dichotomous answer choice format for 'environmental/economic worldview' questions. Data from the campus-wide survey are used to investigate the efficacy of alternative answer choice sets for a worldview question and examine the relationship between participants' stated worldview and their level of support for environmental initiatives. The results suggest that most respondents do not view economic growth and environmental protection as being mutually exclusive. Thus, worldview question formats that force respondents to choose between these two worldview categories appear to misstate individuals' underlying worldviews and may increase item non-response

DEDICATIONS

I would like to dedicate this work to my family in Ghana for always believing in me and for enduring long periods of my absence to enable me pursue my academic goals. I also thank God for his protection and uncommon favor throughout my life.

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TABLE OF CONTENTS

LIST OF TABLES.....	v
LIST OF FIGURES.....	vi
CHAPTER 1- INTRODUCTION.....	1
CHAPTER 2- ESSAY ONE.....	15
CHAPTER 3- ESSAY TWO.....	55
CHAPTER 4 – CONCLUSION.....	91
APPENDICES.....	97

LIST OF TABLES

Table 2.1: Response Rates.....	34
Table 2.2: Mean ratings on self reported level of knowledge of recycling knowledge items.....	36
Table 2.3: Mean ratings on respondents' willingness to receive information.....	39
Table 2.4: Mean ratings of perceived effectiveness of publicity options.....	41
Table 3.1: Worldview Item Non-Response.....	76
Table 3.2: Results for respondents' environmental protection index regressed on worldviews, perceived efficacy, receptivity to information, satisfaction with current initiatives, and environmental knowledge.....	79

LIST OF FIGURES

Figure 3.1: European and World Value Survey Question B008.....	58
Figure 3.2: ‘Standard’ Question-Dichotomous Answer Choices.....	67
Figure 3.3: “Alternative” Question-Three-Answer Choices.....	67
Figure 3.4: Response Distribution by Response Treatment.....	77

CHAPTER 1

INTRODUCTION

1.0 Overview

With increasing environmental challenges threatening the life of our planet, various institutions and communities of all sizes are exploring different strategies to reduce the ecological footprints of modern lifestyles. Among the strategies that are advocated is the promotion of lifestyle changes and increasing pro-environmental behavior. In efforts to promote this behavioral shift, academic literature seems to emphasize increasing environmental awareness among the general public through educational campaigns. It is believed that, an effective educational program can promote general awareness, support, and ownership of sustainability, and, in turn, will encourage the public to adjust their habits and lifestyle towards environmentally benign behavior (Dahle & Neumayer, 2001).

But more than mere general educational campaigns seem necessary. Individuals' values and worldviews are also believed to provide means to influence human behavior. Behavioral scientists suggest that pro-environmental behavior may originate from people's values and their worldviews especially those regarding their relationship with the natural environment (Petersen, Shunturov, Janda, Platt, & Weinberger, 2007; Poortinga, Steg, & Vlek, 2004; Schwartz, 1994; Stern, Dietz, Abel, Guagnano, & Kalof, 1999). Therefore, it seems important to develop an accurate understanding of people's values and worldviews to help inform the formulation of environmental policies (and education campaigns) aimed at promoting behavioral change. This thesis examines and

reports results pertinent to approaches helpful in promoting and implementing pro-environmental behavior.

Chapter Two reports the findings of a study on alternative communication strategies for a new campus-wide recycling program. As part of a research and planning effort centered on increasing campus environmental stewardship and sustainability, research was undertaken to help identify communication strategies and develop an effective publicity campaign for the new recycling program. The chapter examines the relative attractiveness and perceived efficacy of available communication media as well as the information needs of three segments of stakeholders – students, staff, and faculty - as they pertain to a proposed new recycling initiative. Chapter Three presents a report on a related study concerning accurate measure and understanding of individuals' environmental worldviews. That is, the reported research is part of an effort to help develop sound pro-environmental behavioral change efforts that may be based on accurate understanding of participants' worldviews; whether and to what extent potential program participants perceive environmental protection and economic growth as being of paramount importance. Specifically, Chapter Three investigates the efficacy of a widely used dichotomous response choice question on worldviews; whether asking respondents if policy should favor environmental protection or economic growth accurately capture individuals' worldviews regarding the environment/economy relation. Chapter Three also examines the potential implications of individual's worldview preferences on their level of support for environmental initiatives. The thesis concludes with discussion in Chapter Four of the overall results of the two studies and implications of these results.

1.1 Background

Many of the environmental challenges confronting our planet are, to some extent, linked to a direct or indirect consequence of human behavior. To this end, efforts to address these challenges have focused on changing human habits and behavior from those that encourage excessive resource extraction and consumption to those practices that promote material recycling and energy conservation. To promote this behavioral shift, the literature suggests increasing awareness of target populations about the dangers of unsustainable practices while educating them on how to act in an environmentally benign manner (Dahle & Neumayer, 2001; Spellerberg, Buchan, & Englefield, 2004). In a study of campus sustainability efforts, Spellerberg and his colleagues succinctly conclude, “before sustainability can be an integral part of ‘how we do things’, there will have to be considerable effort to draw staff and student attention to the implications of unsustainable practices” (2004, 131). Clearly, raising awareness of target audiences is accepted as an essential ingredient of any effort to change behavior.

For solid waste recycling, the success of any program depends, in part, on growing and sustaining the participation of waste generators in proper material separation and disposal of recyclable waste (Folz, 1991). Previous research indicates that recycling behavior can be increased by improving convenience of recycling, increasing target audiences’ knowledge about program characteristics and providing participants with adequate recycling opportunities (Kelly, Mason, Leiss, & S., 2006; Ludwig, Gray, & Rowell, 1998; McCarty & Shrum, 1994; McDonald & Oates, 2003). While challenges related to

convenience and recycling opportunities could be reduced by improving the amount and locations of recycling bins, increasing knowledge is rather complex. To say the least, some level of an awareness campaign and education is required to influence knowledge. It thus seems imperative that effective publicity and promotions about recycling program characteristics should accompany the implementation of any recycling program. Informing potential participants about recycling program task requirements as well as communicating the value and benefits of recycling to potential participants has been generally accepted as critical aspects of sustaining recycling program participation (Dahle & Neumayer, 2001; Folz, 1999; Iyer & Kashyap, 2007; Scott, 1999; Thomas, 2001). While recycling knowledge may not be a sole determinant of recycling behavior, researchers point out its vital role in predicting recycling participation. Individual's knowledge on how, where, and what to recycle as well as the benefits of recycling has been found to correlate with their participation in recycling programs (Barr, Nicholas, & Gilg, 2003; Kelly et al., 2006; McDonald & Oates, 2003). Consequently, De Young (1989) advised that recycling publicity programs should communicate time and space needs for recycling, inform people about where to go for assistance, and explain what materials can be recycled as well as how they should be prepared. Nonetheless, target populations may differ in their information needs regarding a particular program. Thus, an understanding of the knowledge levels and information needs of target groups is essential to help tailor publicity efforts to meet their specific needs.

Moreover, effective recycling information campaigns depend not only on their content and format but also on their frequency and media used to convey the information (Iyer &

Kashyap, 2007). Several publicity media including newsletters, posters or stickers on bins, television advertisements and personal contacts have been employed to reach out to potential participants with varying degrees of success (Grodzinska-Jurczak, Tomal, Tarbula-Fiartak, Nieszporek, & Read, 2006; Read, 1999). Meneses (2006) attributes failure of some of these media to make the needed impact to Andreasen's (1995) observation that such publicity campaigns too often had focused on what program implementers wanted to transmit instead of on how to adjust the information content and media to the target audience's needs. Therefore, Meneses (2006) emphasized the need for program implementers to gain a more detailed understanding of the characteristics, learning processes, values, and recycling knowledge levels of audiences before designing education programs. It thus seems that the effectiveness of publicity campaigns could be improved with inputs from the target audiences regarding their information needs and preferred communication media. However, the design and tailoring of publicity campaigns for recycling programs especially in educational institutional settings remains largely understudied. This study attempts to bridge this gap in literature as it relates to recycling publicity efforts in a university campus setting.

The literature also highlights the vital role of values and worldviews in shaping human behavior. Values and worldviews are often conceived as guiding principles that influence people towards particular actions (Petersen et al., 2007; Poortinga et al., 2004; Schwartz, 1994; Stern et al., 1999). Therefore, in efforts to garner support for recycling and other environmental initiatives, an accurate measurement and understanding of the public's

environmental values and worldviews is essential to formulate sound environmental policy and strategies to promote pro-environmental behavior.

A key feature in the environmental policy formulation is the potential tension between the goals of environmental protection and economic development. Policymakers are often confronted with choices about how much to protect their citizens through environmental regulations and how much to promote economic development. To help guide policymakers and also to understand changes in the public's environmental concerns, researchers typically employ a dichotomous response choice question to classify respondents as either pro-environment or pro-economic growth/job creation. For instance, in public opinion polls in the United States, the Gallup organization often solicits respondents' view on the economy/environment relation by asking them to choose one of two response options that is closest to their own worldview. These alternative response options are: 1. *Protecting the environment should be given priority even at the risk of curbing economic growth* 2. *Economic growth should be given priority even if the environment suffers to some extent* (Gallup, 2009).

Although this type of dichotomous 'worldview' question has been widely used to inform research and public policy, the efficacy and usefulness of results based on dichotomous response choice formats have been questioned. Some scholars posit that forcing individuals into one of the two policy goals prohibit them from indicating a socially acceptable preference for both or some combination of the two goals (Lieserowitz et al., 2005). Furthermore, findings from recent studies indicate that majority of the public view

the two policy goals as complementary rather than mutually exclusive (Hand & Macheski, 2003; Ladd & Bowman, 1995; Su, 2007). Hence, forcing respondents to self identify with either environmental protection or economic growth may not accurately reflect the actual view of many who view the two goals as complementary. In line with this argument, other scholars predict higher rates of item non-response for the dichotomous response choice question suggesting that respondents who feel their worldview is not accurately represented may opt out and not answer the question (Ladd and Bowman, 1995; Dunlap and Rik, 1991). Krosnick (2002) suggests that respondents who have some information on an issue and generally have an overall neutral orientation towards it, when asked a question without the neutral response option might refuse to answer because the answer he/she would like to give has not be conferred legitimacy. Thus, in the case of the dichotomous response choice question of worldviews, it is suggested that respondents who view the two goals as complementary will be forced to opt out of survey. These critiques motivate a closer examination of the use of this dichotomous response choice question as a tool for understanding public opinion on the environment-economy relation. Chapter Three therefore examines responses of survey participants when presented with the dichotomous response choice question and when an additional response option (indicating a preference for both policy goals) is presented.

1.3 Objectives

The overall objective of these studies was to develop an understanding of the university communities' knowledge, attitudes and behavior towards recycling and their worldview regarding the relationship between the policy goals of economic growth and

environmental protection. The immediate goal of this research was to help university administrators design and implement a new recycling program that will meet the needs of various segments of the university population as well as promote increased participation. The reported research set out to answer the following two sets of research queries:

1. What should be the focus (content) of recycling communication for the various segments of a university population?
2. What is the most effective medium (approach) for communicating recycling and recycling program attributes to the various constituencies of the university community?
3. What communication strategies should be adopted to effectively convey recycling information to the various segments of the university community?

And

4. How do the distributions for the responses “economic growth” and “environmental protection” of the standard dichotomous choice worldview question compare with the responses to an economic growth and environmental protection worldview question that includes a response category indicating preference for both policy goals?
5. Does presenting the environmental protection-economic growth worldview question as a dichotomous choice question impact item non-response?

6. Do people's views of the goals of environmental protection and economic growth have implications on the level of their support for environmental protection initiatives?

1.4 Background on Sustainability Efforts at MSU

Like many institutions of higher learning around the world, Michigan State University (MSU) is striving to reduce its overall ecological footprint by incorporating sustainability measures in its academic, research and operational activities. Sustainability efforts at MSU easily date back to the spring of 1998 as a result of grassroots efforts of some faculty, staff and students. That initial group, the University Committee for a Sustainable Campus (UCSC), proposed a campus environmental assessment plan to the MSU Academic Council. This step eventually influenced the decision for a campus-wide environmental stewardship initiative to be part of the MSU President's Boldness by Design initiative. Since then there has been the creation of an office for Campus Sustainability as well as a research-management sustainability initiative overseen by the MSU Vice President of Finance and Operations to promote research and improved operations involving sustainability initiatives on campus. To reinforce its commitment to sustainability, MSU joined the Chicago Climate Exchange in 2006 with a commitment to reduce its annual greenhouse gas emission by at least 15% by 2015 from the 2000 baseline.

The environmental stewardship initiative, among other things, aims to increase the efficiency of the university's material and energy usage and minimize the campus'

overall ecological footprint. Under the guidance of the Vice President of Finance and Operation, the initiative uses teams of faculty, staff and students in a systems approach to conduct environmental research projects and implement programs. Upon the recommendations of the Environmental Stewardship Systems Team, a \$13.3 million recycling center that meets the requirements of Leadership in Energy and Environmental Design (LEED) certification has been constructed to support the new improved recycling program. Also, a variety of academic programs and research initiatives related to sustainability have been introduced including a new sustainability specialization pending approval by the academic governance to be launched in spring semester of 2010 (Office of Campus Sustainability, 2009; Oswald, 2008).

As MSU leads its efforts in campus sustainability, increased participation by all members of the campus community will be essential. To this end, increase multi-faceted research and planning efforts are being mobilized to inform the design and implementation of new environmental stewardship initiatives.

1.5 Organization of the Thesis

The rest of the thesis is organized as follows: Chapter Two examines the knowledge levels and communication preferences of students, staff and faculty of Michigan State University regarding a new recycling program's communication strategy. That chapter addresses the first three research questions using data from a campus-wide web based survey conducted from November to December 2007. The processes involved in the survey design and administration, method of analysis and a discussion of the results from

the study are also presented. Chapter Three primarily addresses the second set of three research questions. It investigates the efficacy of the dichotomous response choice question to accurately capture the environment/economy worldview of respondents. It also examines the effects of the dichotomous response choice question on item response rates as well as individuals' stated environment/economic worldview on their level of support for environmental protection initiatives. That chapter also discusses the results from the analysis and its relevance to efforts to environmental policy formulation. Chapter Four concludes the thesis with a summary of the two studies, policy implications, contribution and limitations of the study, and suggestions for future research.

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CHAPTER 2 - ESSAY ONE

GARNERING INPUT FOR RECYCLING COMMUNICATION STRATEGIES AT MICHIGAN STATE UNIVERSITY¹

ABSTRACT

With increasing environmental challenges confronting our planet, colleges and universities are trying different approaches for minimizing their adverse environmental impacts. Among the approaches being used to revitalize campus sustainability efforts, new waste management strategies have included attempts to improve campus recycling programs. This paper presents select findings from a comprehensive study at a large, Tier I university aimed at, among other things, informing university administration and decision makers working on the planning and implementation of a new campus-wide recycling facility and program. The researchers used a mixed-method approach to help them develop an understanding of the campus community's 1) perceived barriers to recycling, 2) recycling knowledge, 3) program preferences, and 4) environmental attitudes. The results from a web-based survey (n=3896, RR1=24.9%) suggest, among other things, that communication efforts for recycling programming should focus more on messages concerning *what*, *how*, and *where* to recycle rather than messages on *why* to recycle. Furthermore, the results suggest that recycling-related publicity approaches should differentiate their mode and content for different segments of the community.

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1. INTRODUCTION

Faced with increasing environmental challenges such as non-point source pollution, global climate change, and waste management problems, policymakers, managers, and communities of all sizes are trying different approaches to becoming more environmentally sustainable. For example, water pollution regulation and watershed protection measures of the U.S. Clean Water Act now require 'small municipalities,' including universities and colleges to develop and implement storm water management plans. Colleges and universities, like small municipalities, often encompass large areas of land and diverse populations who must change their behavior in order to achieve natural resource management and environmental protection goals. Furthermore, colleges and universities are typically engaged in complex scientific, social, and educational activities with considerable material consumption and energy usage. As a result, universities may be viewed as communities with significant direct and indirect impacts on the environment (Alshuwaikhat and Abubakar, 2008). Likewise, they may be seen as important actors through research, outreach, and example settings in helping find solutions to challenges that threaten human existence and our planet.

Colleges and universities may be well suited to take the lead on environmental protection and sustainability practices. By promoting sustainability on campus, universities and colleges may teach and demonstrate principles of awareness and stewardship of the natural world and increase societies' environmental sustainability (Pike et al., 2003). In fact, academic institutions worldwide have been engaged in promoting environmental sustainability for quite some time. Beginning in 1972, with the Stockholm Declaration

(UNESCO, 1972), institutions of higher education have attempted to become more sustainable and have entered into international environmental sustainability agreements. In addition to such international and national declarations such as the Tallories Declaration (UNESCO, 1990), many academic institutions have taken “a micro approach to sustainability in higher education by creating institutional environmental policies that are meaningful for their particular situation” (Wright, 2002). For example, colleges and universities have tried to increase recycling on campus as a waste management strategy linked to campus sustainability efforts (Pike et al., 2003; Barlett and Chase, 2004).

In 2006, the Michigan State University Vice President for Finance and Operations [VPFO] launched the Be Spartan Green Environmental Stewardship Initiative with the goal of simultaneously reducing the university’s environmental footprint while increasing the efficiency of material and energy usage. As part of this campus initiative, an improved recycling program was designed, built, and implemented. Consequently, a large multi-faceted research and planning effort was mobilized to inform the design and implementation of the new recycling program. This paper is based on a campus-wide survey that resulted from the VPFO’s integrated research and planning efforts. Specifically, this paper examines alternative communication approaches for informing campus constituencies of a large Midwestern (U.S.) Tier I public university about a new and expanded campus recycling program. Other results from the campus-wide research and planning initiative may be found elsewhere (Gebben, 2008; Hansen et al., 2008).

Researchers report the vital role of information and educational efforts in influencing knowledge about recycling, recycling attitudes, and recycling behavior (Barr et al., 2003; Iyer and Kashyap, 2007). However, the design and tailoring of recycling educational and communication campaigns especially in university settings remain largely understudied. A few studies on recycling information/education campaigns provide suggestions on the format and content of such campaigns to make them effective (Warner et al., 2002). For example, De Young (1989) suggests that recycling education programs should communicate time and space needs for recycling, inform people about where to go for assistance, and explain what materials can be recycled as well as how they should be prepared. However, the success of recycling information campaigns depend not only on their content and format but also on their frequency and mode of communication (media used to convey information) (Iyer and Kashyap, 2007). A variety of media have been reportedly used to communicate recycling program characteristics. Too often, it seems that the selected media have been chosen based on project budgets and preferences of program implementers instead of efficacy or the preferences of the target population(s). Understanding recycling program stakeholders' preferences and perceived effectiveness of potential publicity media should enable program implementers to design and tailor educational programming to be most effective.

This paper uses the results of a campus-wide survey that was sent to one-third of a Tier 1 university's students, staff, and faculty (N=15,652) in an effort to, among other things, better understand how the campus constituencies understand campus recycling and help devise communication strategies for a new recycling initiative. This effort also sought to

measure and understand respondents' level of knowledge of how and where to recycle on campus, environmental benefits associated with recycling, and alternative waste reduction strategies on campus. Also, the study examined respondents' willingness to learn more about recycling benefits and how to recycle properly. After briefly discussing previous work concerning recycling programs at educational institutions, the role of recycling knowledge and behavior, and alternative recycling program information approaches, this paper presents the research methods used to collect data from three constituencies of the campus community. Following that, the paper presents the results of the study before concluding with a discussion of the implications of these findings.

2. BACKGROUND

2.1 Recycling at Educational Institutions

A number of studies have chronicled experiences of some institutions of higher education that have institutionalized recycling programs as part of their campus waste management strategies (Keniry, 1995; Mason et al., 2003; Barlett and Chase, 2004). It appears that the most successful of these programs often share a combination of institutional measures including: 1) positive executive (administrative) support, 2) written environmental policies, 3) provision of resources and incentives, 4) creation of a framework for planning, 5) incorporation of environmental responsibility into the curriculum, 6) environmental research activities, 7) campus ecological planning and design, 8) measurable reductions of costs and wastes, 9) good public relations and documentation, 10) financial accountability, and 11) provision of leadership development and training (Keniry, 1995). Literature suggests that many campus recycling programs have been

driven by students' environmental activism and advocacy to make their campuses "green." For instance, student concern for a lack of on-campus recycling facilities led to the implementation of a zero waste program at Massey University, New Zealand (Mason et al., 2003). Given such a widely-held belief in the crucial role of students in recycling program success, many previous studies of campus recycling programs have focused on the effect of interventions such as rewards, goal setting, feedback, information and education on promoting recycling behavior among students (Geller et al., 1975; Luyben and Cummings, 1981; McCaul and Kopp, 1982; Goldenhar and Connel, 1992; McCarty and Shrum, 1994). Such interventions have often aimed at encouraging the pro-environmental behavior of recycling by targeting students' internal motivations that, in turn, may positively change individuals' attitudes, beliefs, perceived control, and level of responsibility for recycling (Schultz, 2002).

McCaul and Kopp (1982) looked at how goal-setting and public commitment may have impacted aluminum can recycling among students at a US university. They reported that goal-setting (e.g. asking participants to collect a set quantity of recycling materials over a period of time) promoted recycling among the university students but public commitment (eg. publishing names of individuals who have made a commitment to recycle in campus newspapers) did not significantly impact student recycling behavior. At a South Korean university, Kim et al. (2005) report that posting information on recycling receptacles on the percentage of materials correctly separated and weight of materials collected at recycling stations increased the percentage and number of correctly separated aluminum cans and paper. They also found that removal of the recycling feedback corresponded

with a decrease in the percentage of recyclable materials correctly separated on campus (Kim et al., 2005). In a study examining the relative effects of education and feedback strategies on recycling knowledge, attitudes, beliefs and behavior of 1619 university students, Goldenhar and Connell (1992) found that students receiving recycling feedback had higher levels of recycling behavior than those in the recycling education or control groups. A recent review focusing on behavioral issues of successful recycling programs identified both incentives and information as able to increase recycling behavior with informational programs appearing more able to have more long-term effects than incentive programs (Iyer and Kashyap, 2007). Austin et al. (1993) examined the use of prompts and education on paper recycling in two academic departments at Florida State University. Austin et al. found that successful recycling prompts included a specific request/appeal to recycle that was close in proximity to the location for the intended recycling activity (e.g., recycling bins).

Werner et al.(2002) used field experiments at Utah University to examine the influence of using effectively placed and developed signs to increase participation in aluminum can recycling. The messages used by Werner et al. were developed based on models of persuasion to test if signs can have short- and/or long-term impacts on behavior. Their experiments show that simple, well-designed signs can influence behavior while the signs are in place as well as after their removal, as long as people are generally favorable toward the behavior. Incentives such as rewards have also been shown to typically result in greater participation in recycling programs but studies indicate that such behaviors are not sustained once the reward is removed (Iyer and Kashyap, 2007).

Inconvenience and proximity of recycling receptacles have been widely discussed as major constraints to college students' recycling behavior (McCarty and Shrum, 1994; Ludwig et al., 1998; Kelly et al., 2006). Ludwig et al. (1998) reported an increase in the number of aluminum cans recycled when recycling receptacles were moved from academic building hallways to the classrooms. They attributed this increase to the convenience of having the receptacles closer to the point of students' consumption (in the classroom). Similarly, other studies report that students often claim a lack of storage space as well as an absence of recycling bins at convenient locations are their reasons for not recycling (Williams, 1991; Pike et al., 2003).

Other researchers have examined respondents' attitudes, knowledge and recycling behavior as explanatory reasons for individuals' participation in university recycling programs (McCarty and Shrum, 1994; Ludwig et al., 1998; Cheung et al., 1999; Jennings, 2004; Kelly et al., 2006; Hansen et al., 2008). For example, pro-environmental attitudes among college students in Hong Kong were found to predict their pro-environmental behavior (increased wastepaper recycling) (Cheung et al., 1999). Cheung et al. (1999) used the Theory of Planned Behavior (TOPB) to examine waste paper recycling behavior among undergraduates in Hong Kong. Their results revealed that TOPB significantly predicted both behavioral intention and subsequent wastepaper-recycling behavior. Meinhold and Malkus (2005) found an increased likelihood that students (high school students from 3 cities on US west coast) with pro-environmental attitudes demonstrated pro-environmental behaviors with increased environmental knowledge adding to the impact of pro-environmental attitudes on behavior. These studies indicate that students

who consider recycling as a positive behavior are more likely to seek information and to recycle more consistently. In addition, social norms and past behavior have also been found to play an important role in predicting recycling on campus (Cheung et al., 1999; Jennings, 2004). In her online report on recycling behaviors and attitudes of first-year university students at the University of Connecticut, Jennings (2004) found the influence of social norming (recycling) had a profound effect on the pro-environmental behaviors of college students.

Previous research indicates that recycling behavior at university campuses may be increased by adding recycling options, raising community members' knowledge of recycling, and by improving the convenience of recycling. While providing improved recycling logistics, like recycling bins, can increase convenience and provide more recycling opportunities, efforts to improve the knowledge levels of target populations concerning recycling are rather complex. To date, only a few studies have focused on strategies to improve the general knowledge of campus communities about recycling and even fewer studies seem to have used preferences of the target audience to do so.

2.2 Knowledge and Campus Recycling Behavior

General knowledge of the importance of recycling as well as recycling program characteristics is reported to influence attitudes and motivate recycling behavior. Empirical evidence suggests that individuals' participation in recycling programs is correlated with their knowledge of how, where and what to recycle as well as their knowledge of how recycling benefits the environment (Folz, 1999; Tucker, 1999; Barr et

al., 2003; McDonald and Oates, 2003). Likewise, an absence of specific knowledge about recycling program characteristics has been identified as a barrier to recycling program participation (Read, 1999; Kelly et al., 2006). For instance, Kelly et al (2006) found that, among students and staff of Massey University, New Zealand, a lack of program specific information (types of waste that can be recycled and where to take recyclables) was widely cited by students as a reason for not recycling. In the same way, general environmental knowledge was found to significantly predict waste paper recycling behavior among undergraduates in Hong Kong (Cheung et al., 1999).

While knowledge about recycling program characteristics may not be the sole motivator of recycling, it is generally viewed as an important barrier to recycling (Schultz, 2002). Besides lowering recycling intensity and collection efficiency, a lack of recycling knowledge was associated with increased contamination levels of recyclable material collected (Scott, 1999). That is, the less program participants know about the program, the greater their failure to properly participate (e.g., sort materials, separate trash). Therefore, adequate communication of specific recycling program characteristics as well as the environmental benefits of recycling seem to be important in promoting sustainable pro-environmental behavior, changing potential participants' habits, and improving recycling efforts (Read, 1999; Evison and Read, 2001). Nevertheless, the tailoring and implementation of campus recycling program communication strategies have been largely understudied. This is also true when it comes to understanding the state of knowledge of recycling program stakeholders and what specific recycling information should be communicated as well as how such information should be conveyed.

2.3 Recycling Communication Strategies

It seems axiomatic that effective publicity and promotion about recycling program characteristics should accompany the implementation of any recycling scheme. Informing potential participants about what they are supposed to do as well as communicating the value and benefits of recycling to potential participants has been generally accepted as critical to sustaining recycling program participation (Folz, 1999; Dahle and Neumayer, 2001; Thomas, 2001). Several approaches (media or modes) have been used to communicate recycling program information to individuals. These communication modes include newsletters, television advertisements, stickers on bins, radio commercials/public service announcements and personal contacts. Some of these modes have been employed in university settings.

In their work exploring the greening of higher education institutions, Dahle and Neumayer (2001) reported that one of the most important measures that need to be taken is to raise environmental awareness within campus communities. Some approaches in the United Kingdom highlighted by Dahle and Neumayer included The University of Bath's creation of a guidance booklet about greening the institution as well as disposal routes for waste materials and waste classifications and John Moores University's website and a monthly newspaper for informing students and staff about environmental gains and areas that need improvement (Dahle and Neumayer, 2001).

Some institutions have designed recycling coursework as part of their efforts to communicate recycling information and increase environmental awareness. For example,

Francis Marion University, a state-supported liberal arts college in South Carolina, US, developed a recycling course in an attempt to satisfy the students' goals of increasing campus awareness about sustainability and recycling, and the teachers' goals of using problem-based learning approaches in class (Pike et al., 2003). Most often, it appears that the communication modes have been determined more by the recycling program's budget than by demonstrated effectiveness (Read, 1999; Salhofer and Isaac, 2002; Martin et al., 2006; Timlett and Williams, 2008).

While some recycling programs and their communication methods seem to have been successful in increasing participation (McDonald and Ball, 1998; Mee and Clewes, 2004), others have failed to do so. For example, Read (1999) notes that despite extensive publicity using leaflets and newsletters over a period of several years for a curbside recycling scheme in Kensington and Chelsea, England, many residents there claim to have never seen the publicity. De Young (1989) looked at recycling knowledge differences between recyclers and non-recyclers and found that recycling education programs need to focus on basic information needs. De Young suggests those basic communication needs include: the time and space needs for recycling, an explanation of what materials can be recycled and how they should be prepared, and provision of information about where people may go for assistance.

Meneses (2006) attributes failure of many environmental education programs, such as recycling communication programs, to Andreassen's (1995) observation that such programs too often focus on what the organization wants to transmit instead of on how to

adjust the environmental content to the target audience's needs. Therefore, Meneses (2006) concludes that it seems logical to emphasize the need for educators to gain a more detailed understanding of the characteristics, learning processes, values, and recycling knowledge levels of audiences before designing education programs. Successful recycling program communication approaches seem to depend on understanding the perspectives and perceptions of the target groups. It appears that individuals may increase their recycling activities for a variety of reasons when there are appropriate communication strategies. Such strategies appear to be central to improving recycling behavior. The design and tailoring of recycling program educational and communication campaigns remains largely understudied. Therefore, this paper attempts to address this gap as it relates to recycling program communication strategies for a large, research-intensive university community in the Midwest (U.S.).

3. MATERIALS AND METHODS

3.1. Research Questions

The research reported here focuses on Michigan State University student, staff, and faculty recycling program knowledge and communication preferences which will help inform new recycling program communication strategies. Specifically, this paper addresses the following research questions:

- 1) What should be the focus (content) of recycling communication for the various segments of a university population?
- 2) What is the most effective medium for communicating recycling program attributes to the various constituencies of a university community?

- 3) What communication strategies should be adopted to effectively convey recycling information to the various segments of the university community?

3.2 Research Site

This study was conducted on the campus of Michigan State University [MSU], a large Tier 1 public university in the Midwest of the United States. As a pioneer land-grant institution in the US, MSU has a long tradition of using the research and knowledge it generates to create practical solutions that make a difference for individuals and communities across Michigan and around the world. The campus is situated on more than 5,200 acres of land and consists of over 580 buildings on the contiguous campus including 85 with instructional space. The university offers more than 200 different programs for undergraduates and graduate studies in 17 degree-granting colleges. With about 10,000 graduate and professional students and over 36,000 undergraduates, the university runs one of the largest residential hall systems in the United States and employs over 10,000 faculty and staff personnel. Roughly 8% of MSU students are international students from about 130 different countries.

Like most institutions of higher education, the MSU community engages in various activities that generate large volumes of solid waste. During the 2004/5 academic year, an estimated total of 12,100 tons of waste from MSU was sent to landfills. As part of its solid waste management strategy, MSU institutionalized a recycling program in 1990 that primarily focused on collecting white paper, mixed paper, magazines, newspapers and cardboard from academic buildings. In the first year of the program, about 200 tons of

paper were recycled. In 2006, more than 1,600 tons of paper were recycled. While the university has had some collection locations for newspapers, corrugated board, steel cans, aluminum, clear glass, brown glass, plastic bottles, magazines, white paper, and mixed paper recycling, the previous MSU program was not especially well coordinated. Typically, MSU stakeholders complained about the relatively small number of recycling bins seemingly scattered across campus in relatively unknown locations (Hansen et al. 2008). In its effort to extend its land grant university mission and decrease its environmental footprint, MSU authorized funds for the planning, design, construction, and implementation of a state-of-the-art campus-wide recycling program with a newly built recycling center.

3.3 Survey Design

As part of a larger campus sustainability planning effort, researchers began to develop a web-based survey using an iterative process. First, a series of key informant interviews were conducted with university administrators, consulting engineers, faculty active in university environmental affairs, as well as with undergraduate and graduate students. Next, focus groups with members of the target audiences were conducted followed by an iterative survey design/pretesting/revision process (Kaplowitz et al., 2004). Some research results based on analyses of the project's focus group data have been published (e.g., Hansen et al. 2008). The final web-survey of recycling program design seamlessly routed respondents through a series of questions about recycling options for where they live and work, their recycling knowledge and attitudes, and their preferences regarding alternative recycling program characteristics (See Appendix 1 for survey sample pages).

Analyses of the recycling program preference questions are reported elsewhere (Gebben, 2008).

Questions in the survey were designed to help develop an effective communication strategy as part of the university's implementation of a new campus recycling initiative. In line with recommendations in Meneses (2006), survey questions sought to measure levels of awareness of university community constituencies concerning campus recycling efforts as well as respondents' receptivity to receive information on recycling. Survey items were also designed to measure respondents' perceived effectiveness of a range of communication options as well as gauge respondents' preferred media for receiving campus recycling information. The questions took into account respondents' knowledge of the then current campus recycling program features. For instance, since the existing program focused primary on paper products, questions were asked of participants concerning their knowledge of the range of paper products that could be recycled on campus. The survey items were also informed by input from university's communication team on available and likely communication modes (media) and publicity options (posters, personal contacts, media ads, promotions and technology publicity). Pretesting including focus groups and one-on-one interviews led researchers to conclude that respondents understood each of these publicity options and therefore could make informed choices (See Appendix 1).

3.4. Sampling Procedure and Implementation

The university community consists of three principle constituencies—students, faculty and staff. To ensure each of these campus constituencies was adequately represented in the study, a stratified random sampling technique was employed. A random sample list was generated for each campus constituency (students, staff and faculty) with each list consisting of 30% of each group. The sample lists were randomly drawn from the university official records² to ensure that each university community member had an equal probability of being selected. Overall, 15,652 faculty, staff, and students were selected as part of a stratified random sample to participate in the study. The Michigan State University registrar provided the researchers with the random sample of student (email and mailing addresses) and the university computing service provided the random sample lists of faculty and staff. The degree of control as well as background respondent information for the sample list is unique relative to other on-line surveys since it allowed researchers to track who received invitations to participate, who responded as well as some demographic characteristics of the entire population, not just those who participated in the study. An initial invitation was sent to all members of the sample during November 2007, informing them of the study and providing them with a link to the survey. Up to two additional invitations to participate were sent to potential respondents during November and December 2007. That is, those members of our sample who did not

² Because students may restrict all or part of their directory information from release to any third party in accordance with the Family Education Right to Privacy Act (FERPA) and faculty/staff may also restrict home address and phone information, the master lists for drawing the three sample lists were slightly smaller than the actual population of each group.

participate in the survey after the first invitation were asked to participate a second time, and finally, non-respondents were contacted a third time and reminded to participate.

4. RESULTS

Completed surveys, returned invitations to participate, and other outcomes were recorded for each member of the sample. The submitted survey data were checked for errors, placed into standard spreadsheet data files (e.g., Microsoft Excel®), and imported into statistical software files for further analyses (e.g., Statistical Package for Social Scientist, SPSS®). Subsequent analyses included computing and analysis of the mean response to each survey item in the aggregate as well as for each of the three campus constituencies (groups). Within the groups (students, faculty and staff), we examined differences across individual survey items and measures. Since individuals answered the multiple survey items that were related to key concepts under investigation, a pair-samples t test was used to examine significant differences across select survey items. We also tested for significant differences among the mean responses of the three groups to survey items using an analysis of variance test (ANOVA). Where significant differences were found across groups, further analysis using the Tukey post hoc test was undertaken to explore where the differences exist. In order to provide guidance for policymaking, we constructed a relative ranking of the survey item responses based on the mean scores for these items. In these rankings, we made sure to group together items that were not significantly different from each other in the same rank (e.g., 1st, 2nd, 3rd) so that differently ranked items are significantly different from each other.

4.1 Response Rate

Table 2.1 presents the overall (total) response rate of our survey as well as the response rate for each of the three campus constituencies. Overall, a total of 15,652 survey invitations were sent to 12,108 students, 1,481 faculty and 2,063 staff (about 30 percent of MSU). Of those invitations, 182 were determined to have been sent to incorrect addresses and were deemed to be ineligible. A total of 3896 individuals participated in the survey. As Table 1 illustrates, the American Association for Public Opinion Research (AAPOR) minimum response rate (RR1) for the study was 24.9 percent (AAPOR, 2006) with variations across the groups. Staff responded at a higher rate (42.8%) than faculty (38.0%) and students (20.2%). These response rates are significantly different across the different campus sub-populations - students, faculty, and staff ($\chi^2(2, n=15652)=630.85$, $p=0.000$). It is fair to say that more staff responded than faculty and that more faculty responded than did students. In the aggregate, respondents were approximately 58% females and 42% male, which varies only slightly from overall university demographics. A higher proportion of staff (67%) and students (57%) respondents were females while majority of the faculty respondents were males (59%). These differences do roughly mirror the demographics of the university community.

Table 2.1 Response Rates

Group	Addressees	Completes	RR1
Total	15,652	3,896	24.9%
Students	12,108	2,450	20.3%
Faculty	1,481	563	37.8%
Staff	2,063	883	42.8%

4.2 Recycling Knowledge

Respondents' current level of knowledge of university recycling and waste management efforts was assessed using questions with five-point Likert-type response choices, with 1 indicating 'not at all knowledgeable' and 5 indicating 'very knowledgeable'. Respondents rated their level of knowledge concerning the range of paper products that may be recycled on campus (paper products recycle), environmental benefits associated with recycling (environmental benefits), different places on campus where materials can be recycled (recycling location), and waste reduction strategies they can use on campus (See Appendix 1 for examples of survey questions). Table 2.2 reports the mean scores and rankings of responses to the recycling knowledge items. Table 2.2 (like Tables 2.3 and 2.4) presents aggregate results for the university community as well as results for each of the three sub-populations—students, faculty and staff. Within each constituency, the relative ranking of the knowledge items is provided. Recall that items whose mean scores are not significantly different are placed in the same rank. We also present the relative ranking of each item across the three constituencies as denoted by the superscript

letters (a,b,c). That is, if an item has the same relative rank (e.g., 1st) for students, faculty, and staff, then that item would have the same superscript letter (e.g., a) in the three groups. So, items across groups with the same letter are not significantly different from each other.

In the aggregate, environmental benefits was ranked as the item about which the university community is most knowledgeable while knowledge of the different places on campus where materials can be recycled (recycling location) was ranked as the item the university community is least aware. Knowledge of the waste reduction strategies on campus also appears higher for the university community than knowledge of the range of paper products that can be recycled. A paired-samples *t* test revealed significant differences between the means of these survey items at a 95% confidence interval. The university community's mean knowledge of the environmental benefits ($M=3.79$ $SD = 0.95$) was significantly greater than their knowledge of waste reduction strategies ($M=3.15$ $SD=1.02$), $t(3805)=35.73$, $p<0.001$; knowledge of paper products recycled ($M=2.59$ $SD=1.04$), $t(3790)=-65.01$ $p<0.001$, and their knowledge of recycling locations ($M=2.36$ $SD=1.11$), $t(3802)=69.14$ $p<0.001$. In descending order of awareness, the university community ranked their knowledge of the following items: environmental benefits, waste reduction strategy, paper recycling and recycling location (See Table 2.2).

Table 2.2 Mean ratings on self reported level of knowledge of recycling knowledge items (5-point scale: 1= Not at all knowledgeable to 5= very knowledgeable)

Knowledge items	Mean*	Standard Deviation	Rank*
University community			
Environmental benefits	3.79	0.95	1st
Waste reduction strategies	3.15	1.02	2nd
Paper product recycle	2.59	1.04	3rd
Recycling location	2.36	1.11	4th
Students			
Environmental benefits	3.83 ^b	0.94	1st
Waste reduction strategies	3.03 ^b	1.04	2nd
Paper product recycle	2.56 ^b	1.03	3rd
Recycling location	2.47 ^a	1.11	4th
Faculty			
Environmental benefits	3.97 ^a	0.94	1st
Waste reduction strategies	3.36 ^a	0.99	2nd
Paper product recycle	2.71 ^a	1.03	3rd
Recycling location	2.30 ^b	1.11	4th
Staff or support			
Environmental benefits	3.62 ^c	0.93	1st
Waste reduction strategies	3.34 ^a	0.97	2nd
Paper product recycle	2.61 ^b	1.05	3rd
Recycling location	2.11 ^c	1.11	4th

* Within group, each rank (1st, 2nd, etc) is significantly different, $p < 0.05$
Across the groups, each letter (a,b,c) is significantly different at $p < 0.05$

The relative ranking of the knowledge items for the three campus constituencies does not appear to differ from the aggregate rankings for the sample population. As Table 2.2 illustrates, recycling knowledge levels of students, staff, and faculty concerning the locations on the university campus where materials can be recycled was generally low (2.47 to 2.11) and knowledge of the environmental benefits of recycling was highest (3.97 to 3.62). However, the mean scores on these knowledge items does appear to be significantly different across groups. For instance, faculty self-reported having significantly greater knowledge than did students on the environmental benefits of recycling; waste reduction strategies; and the paper products that can be recycled on campus. Faculty also self-reported significantly greater levels of knowledge as compared to staff on most items. At the same time, students expressed having greater knowledge of the environmental benefits of recycling and the different places on campus where materials can be recycled than did staff. However, students reported a relatively low level of knowledge of waste reduction strategies on campus.

4.2 Recycling Information Needs/Desires

Respondents were asked to self-report their interest in receiving information on how to recycle materials properly as well as the benefits of recycling. Using a five-point Likert-type scale from 'strongly disagree' to 'strongly agree,' respondents were asked to indicate their level of agreement with the following two statements: "*I would like to learn more about the benefits of recycling,*" and "*I would like more information on how to recycle materials properly.*" Table 2.3 illustrates the mean responses of the aggregate sample as well as those of the three campus constituencies. A higher degree of agreement

with each statement indicates greater desire on the part of respondents to receive such information.

As shown in Table 2.3, the mean score for willingness to receive information on how to recycle properly for the university community was 3.69 while that of the various campus segments ranged from 3.74 among staff to 3.58 for faculty. Similarly, the mean score for willingness to receive information on the benefits of recycling was 3.38 for the university community and ranged from 3.43 for students to 3.06 for faculty. These results suggest a general willingness of respondents to receive information from the university in both areas—recycling benefits and how to recycle properly. However, a paired-samples t-test comparing the mean willingness to learn about how to recycle ($M=3.69$ $SD=0.92$) and the environmental benefits of recycling ($M=3.38$ $SD=0.94$) reveals significant differences for the two items; $t(3696) = -24.00$ $p < 0.001$. This result indicates a greater willingness of the university community to learn about how to recycle properly than to learn about the environmental benefits of recycling. This was also true for all the three campus constituents. Across the campus groups, there were significant differences in the mean score for these two statements. While students did not significantly differ from staff in their desire to receive information on both how to recycle and the benefits of recycling, faculty expressed a significantly lower desire to receive information about recycling topics than students and staff.

**Table 2.3 Mean ratings on respondents' willingness to receive information
(5-point scale: 1=strongly disagree to 5=strongly agree)**

Information need	Mean	Standard deviation	Rank
University community			
How to recycle properly	3.69	0.92	1st
Benefits of recycling	3.38	0.94	2nd
Students			
How to recycle properly	3.70 ^a	0.94	1st
Benefits of recycling	3.43 ^a	0.93	2nd
Faculty			
How to recycle properly	3.58 ^b	1.03	1st
Benefits of recycling	3.06 ^b	1.02	2nd
Staff or support			
How to recycle properly	3.74 ^a	0.81	1st
Benefits of recycling	3.41 ^a	0.89	2nd

* Within group, each rank (1st, 2nd, etc) is significantly different, $p < 0.05$
Across the groups, each letter (a,b,c) is significantly different at $p < 0.05$

4.3 Publicity Option

To help determine the most effective methods (media) for communicating recycling program information (publicity options) to the campus populations, respondents were asked to rate the effectiveness of five publicity options: posters, media ads, technology publicity, personal contacts and promotions. The survey provided a brief description of each of the five publicity options to enable respondents to make informed ratings (See Appendix 1). Respondents rated their opinion of the effectiveness of each publicity option using a five-point scale with 1 indicating 'very ineffective' and 5 indicating 'very

effective'. Table 2.4 presents the mean effectiveness rating for each publicity options for the university community as a whole as well as for each group (faculty, staff, and students). Respondents saw all five publicity options as somewhat effective means for publicizing recycling and recycling program information on campus. The mean scores for the publicity option effectiveness ranged from 3.94 to 3.57 for all respondents; 4.11 to 3.62 for students; 3.67 to 3.36 for faculty; and 3.87 to 3.55 for staff. Our analysis of these results revealed some significant differences in publicity option effectiveness within each campus group. In the aggregate, respondents ranked the effectiveness of publicity options as follows: promotion, personal contacts, posters, media ads, and technology publicity with each rank statistically different from each other at 95% confidence interval.

As Table 2.4 illustrates, each of the three campus community groups significantly differed in their relative ranking of media effectiveness. While students ranked promotions as most effective (ranked 1st), faculty and staff did not perceive promotions as being that effective (ranked 3rd and 2nd, respectively). Conversely, staff and faculty see the use of personal contact as the communication strategy the most effective communication strategy for the new recycling program (ranked 1st) while students do not (ranked 2nd). For student respondents, the perceived mean effectiveness of posters as a communication strategy ($M=3.66$, $SD=0.92$) was not significantly different from the use of technology publicity ($M=3.62$, $SD=1.04$), $t(2310)=160$, $p<0.11$.

**Table 2.4 Mean ratings of perceived effectiveness of publicity options
(5-point scale: 1=very ineffective to 5=very effective)**

Publicity option	Mean	Standard deviation	Rank
University community			
Promotion	3.94	0.99	1st
Personal contacts	3.83	0.98	2nd
Media ads	3.69	0.91	3rd
Posters	3.65	0.93	4th
Technology publicity	3.57	1.04	5th
Students			
Promotion	4.11 ^a	0.92	1st
Personal contacts	3.84 ^a	0.98	2nd
Media ads	3.76 ^a	0.89	3rd
Posters	3.67 ^a	0.92	4th
Technology publicity	3.62 ^a	1.04	4th
Faculty			
Promotion	3.46 ^c	1.12	2nd
Personal contacts	3.67 ^b	1.08	1st
Media ads	3.42 ^c	0.98	2nd
Posters	3.47 ^b	1.01	2nd
Technology publicity	3.36 ^b	1.11	2nd
Staff			
Promotion	3.76 ^b	0.99	2nd
Personal contacts	3.87 ^a	0.93	1st
Media ads	3.65 ^b	0.90	3rd&4th
Posters	3.70 ^a	0.88	3rd
Technology publicity	3.55 ^a	0.99	4th

* Within group, each rank (1st, 2nd, etc) is significantly different, $p < 0.05$
Across the groups, each letter (a,b,c) is significantly different at $p < 0.05$

Staff also seem to be indifferent between the efficacy of posters ($M=3.72$, $SD=0.86$) and promotion ($M=3.78$, $SD=0.99$), $t(850)=1.45$, $p<0.15$ as well as posters and media ads ($M=3.67$, $SD=0.89$), $t(850)=1.57$, $p<0.12$. When comparing the perceived effectiveness of the various publicity options for faculty respondents, the results revealed that only personal contact is significantly different from the other publicity options. That is, faculty rate personal contact as their preferred communication approach and see posters, promotions, media ads and technology publicity to be uniformly less effective.

Analyses of the publicity ratings across the campus groups reveal that faculty seem to perceive all five publicity options as less effective than do the students and staff. For instance, although faculty rank personal contacts as the most effective option, their rating of personal contacts' effectiveness ($M= 3.67$) was significantly lower than the effectiveness rating for personal contacts by staff ($M= 3.87$) and students ($M= 3.84$). Student respondents' effectiveness rating of personal contacts, posters and technology publicity was not significantly different from those of staff respondents (Table 2.4).

5. DISCUSSION

This study focused on identifying recycling knowledge gaps as well as effective communication options as part of an effort to inform the design and implementation of a new recycling initiative. The state of knowledge of the university community as it relates to campus recycling and waste reduction strategies was assessed using a campus-wide survey. The results show that the university community is somewhat aware of the environmental benefits of recycling but that community members lack knowledge of the

range of materials that can be recycled and the places on campus where these items can be recycled. This finding was true for students, faculty and staff respondents. The results indicate that the university community has a greater willingness to learn about how to recycle properly rather than learn about benefits associated with recycling. The findings suggest that recycling program administrators need to have communication strategies that do more than explain reasons why one should recycle. That is, communication campaigns lead to increased recycling participation when gaps in participants' knowledge of how to act, what can be recycled and where to take recyclables are addressed (McDonald and Oates, 2003; Do Valle et al., 2004; Kelly et al., 2006). The lack of knowledge on what and how to recycle properly can result in lower recycling intensity and increased contamination levels of collected recyclables (Scott 1999). While increasing participation is critical to the success of recycling programs, how well individuals recycle (e.g., proper separation) and how effectively they participate is also important (Thomas, 2001). Consequently, as this study's results suggest, recycling publicity efforts should focus on educating communities' constituencies about the range of materials that can be recycled (what) and the different recycling collection locations (where). Doing so would address the relatively low levels of knowledge reported by respondents in these areas as well as promote increased knowledge on how to recycle properly. Since the three campus groups did not significantly differ in their relative rankings of the knowledge items and their receptivity to recycling information, it appears the focus and content of recycling publicity campaigns covering what, where, and how to proceed with campus recycling need not differ across the three campus populations.

The campus community appears receptive to information on both how to recycle properly and the benefits of recycling. This receptivity to recycling information could be linked to a general positive attitude of the university community towards the recycling program as well as a desire to improve their recycling knowledge. Previous literature has found students with positive attitudes towards recycling to be more likely to seek information and recycle consistently (Jennings, 2004). The respondents' general receptivity to recycling information could be motivated by their relatively high knowledge of the environmental benefits of recycling and thus a desire to recycle. A recent study on the MSU campus supports this idea. Focus groups revealed a general positive attitude of participants toward recycling and environmental initiatives at MSU (Hansen et al., 2008). That insight, together with the survey results, are not in line with Kelly et al. (2006) who report the campus community of Massey University as not wanting to receive information on the university recycling scheme or on recycling in general.

In addition, the reported results highlight the importance of recycling availability and convenience on campus. Generally, respondent knowledge of the different campus recycling locations is the knowledge item with the lowest mean scores for each of the campus populations. If adequate recycling receptacles were to be placed at convenient locations across campus, one would at least expect the recycling program to overcome the lack of knowledge of where to take recyclables. Such an assumption is supported by the increased recycling observed by Ludwig et al. (1998) upon moving receptacles into a more convenient location. Our result may thus imply that, the current program has failed either to adequately inform community members of collection locations and recycling

opportunities on campus or provide adequate logistics for recycling. Therefore, while educating the Michigan State University community on where and why to recycle, MSU appears to be justified in their plans to provide increased numbers and types of recycling bins at convenient locations across campus. Doing so is in line with our results as well as previous literature since knowledge of recycling program characteristics alone is insufficient to promote recycling when necessary logistics like recycling bins are absent (McCarty and Shrum, 1994; Ludwig et al., 1998; Williams and Kelly, 2003).

To overcome subjects' recycling knowledge gap, the design and implementation of a communication strategy that effectively addresses the information needs of the campus population is necessary. This is consistent with the literature demonstrating correlation between recycling participation and individuals' knowledge of how, where, what, and why to recycle (Folz, 1999; Tucker, 1999; Barr et al., 2003; McDonald and Oates, 2003). Furthermore, Read (1999), Schultz (2002), and Kelly, et al. (2006) all identified absence of knowledge pertaining to recycling program characteristics as a barrier to recycling participation. Among the variety of techniques that may be employed to publicize recycling on campus, the study results show that different target populations on campus perceive different communication/publicity methods to be most effective. Respondents rated all five publicity options as being somewhat effective methods for publicizing recycling on campus. This may imply that any of the publicity options could potentially be an effective communication channel. Such acceptance of publicity options in general seems reasonable, since the literature says little about particular communication techniques while asserting that informing participants of the values and benefits of

recycling is critical for sustaining participation (Folz, 1999; Dahle and Neumayer, 2001; Thomas, 2001).

However, the three segments of the population ranked the relative effectiveness of the various publicity options differently. This may suggest the need to use different media to communicate recycling information to different groups depending on what media they deem to be effective. This finding provides support for the need to tailor recycling publicity programs to specific target audiences (Howenstine, 1993). The ranking of perceived effectiveness of the publicity options revealed that promotions are highly favored by students, while faculty and staff prefer personal contact. Promotional campaigns such as competitions between campus units have been shown to encourage pro-environmental behavior among college students (Marcell et al., 2004). The observed differences in perceived effectiveness of publicity options could be explained partly by the fact that various campus segments differ in their demographic characteristics and the common areas and activities in which they engage on campus. Furthermore, the “promotion” publicity option appears as the only choice that provides some form of incentive to respondents. The possible incentives associated with promotion might have influenced its high ranking among students considering their relatively low socioeconomic status. However, Iyer and Kashyap (2007) warn that while incentives have typically resulted in greater recycling participation, the behavior is not sustained after the reward is removed. Therefore, despite the appeal demonstrated by students for promotional communication, this technique may be less effective in the long-term.

Personal contacts, though ranked second in the aggregate, appear to be the most favorable communication strategy for faculty and staff. Thus, there appears to be a rationale to use personal contacts for communication about a recycling program. Studies examining the effectiveness of communication strategies for recycling have reported favorable impact of personal contacts in influencing behavioral change (Read, 1999; Grodzinska-Jurczak et al., 2006). However, the literature maintains that its effectiveness depends on how well versed the trained contacts are in the issues of recycling to be able to provide necessary supportive evidence and argument for the program (Read, 1999). Hence, when considering personal contact as a publicity option, it is essential that the trained contacts/mentors possess a great deal of knowledge regarding the operations of the campus recycling scheme as well as the benefits of recycling as a whole. Further, the communication strategy should consider options for developing a network of personal contacts for each stakeholder group such as building or departmental level environmental stewards.

Although technology publicity is widely used for communication purposes among the campus populations, it was perceived to be the least effective among the campus population for communicating about campus recycling. Read (1999) describes how, despite extensive publicity over several years for a recycling program in Kensington and Chelsea, England, many residents there claim they never saw the publicity. Thus technology publicity might be so abundant that it could easily be overlooked and therefore may not achieve the desired impact of publicizing recycling on campus. On the other hand, media ads and posters appear to be moderately favored by the campus

segments and could potentially be used to complement the promotion and personal contacts. The differences in the campus constituent groups' relative rankings of the publicity options underscore the need for target populations' inputs in the design of a communication strategy. It also implies that, no single communication approach could effectively produce the desired outcome. Proposed publicity approaches should differentiate their mode based on the target audiences.

6. Conclusion

In 2006, Michigan State University launched the Be Spartan Green Environmental Stewardship Initiative and as part of this campus initiative, an improved recycling program is being designed, built, and implemented. MSU is not alone in such efforts as numerous colleges and universities have tried to increase campus recycling to manage waste and demonstrate campus sustainability efforts (Pike et al., 2003; Barlett and Chase, 2004). Growing and sustained participation of university community members is central to the success of any campus-recycling program especially when the program relies on proceeds from sales of materials to cover cost. It is thus essential to design and implement strategies that will minimize the barriers to recycling and thereby enhance participation. The literature indicates information and education efforts have a vital role in influencing knowledge about recycling, recycling attitudes, and recycling behavior (Barr et al., 2003; Iyer and Kashyap, 2007). Thus, in efforts to improve recycling on the university campus, this study has focused on understanding the campus community's recycling knowledge of the university's recycling and waste reduction efforts, their willingness to receive information on recycling as well as their perceived effectiveness of

various communication alternatives towards the design of an effective communication strategy.

The study revealed a recycling knowledge gap among the segments of the university community on what to recycle, where to recycle and how to recycle. It is recommended that recycling publicity campaigns should focus first on educating the university community on these items. Not only is this recommendation in line with our own findings, but is also supported by the literature which indicates communication increases recycling participation when it addresses such knowledge gaps as how, what, and where to recycle (DoValle, et al., 2004, Folz, 1999, Kelly, et al., 2006, McDonald and Oates, 2003, Tucker, 1999). Respondents appear receptive to such a publicity campaign and expressed their willingness to receive this type of information. We also recommend the provision of adequate recycling bins at convenient locations on campus to help increase the convenience of recycling, provide more recycling opportunities and to assist in addressing the knowledge gaps on where material can be recycled. This is in line with our results as well as previous literature which denote that knowledge alone is insufficient to promote recycling without the necessary logistics (McCarty and Shrum, 1994; Ludwig et al., 1998; Williams and Kelly, 2003)

Finally, although the university community, in the aggregate, perceived all five communication alternatives to be somewhat effective, it is recommended that a recycling program publicity approach differentiate publicity efforts according to stakeholder groups' knowledge and preference—It appears that one size does not fit all. Our results

indicate that students highly favor promotions while faculty and staff prefer personal contact, which ranked second behind promotions for students. Studies have reported that personal contacts can have a favorable impact in influencing positive recycling behavior (Read, 1999; Grodzinska-Jurczak et al., 2006). Furthermore, recommending the use of promotion to communicate recycling information to students is not only supported by our research, but the literature also illustrate that promotional campaigns have encouraged college students to participate in pro-environmental behaviors (Marcell et al., 2004). However, Iyer and Kashyap (2007) caution the use of incentives because the behavior is not typically sustained after removing the reward. Therefore, despite the appeal demonstrated by students for promotional communication, this technique may be less effective in the long-term and ought to be coupled with other publicity techniques.

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CHAPTER 3 - ESSAY TWO

ASKING WHETHER RESPONDENTS FAVOR ENVIRONMENTAL PROTECTION OR ECONOMIC GROWTH MAY MISS THE MARK: TESTING A DICHOTOMOUS CHOICE ENVIRONMENTAL POLICY QUESTION

ABSTRACT

Individuals' and societies' worldviews, as they relate to the environment, have been traditionally classified as either pro-environmental protection or pro-economic development. However, the usefulness of this dichotomous classification has not been thoroughly examined. Using results from a web-based survey (N=3922, RR=24.9%), this study examines the efficacy of a widely used dichotomous response choice question to accurately capture individuals' worldviews regarding pro-environmental policy and pro-economic policy. The paper also examines possible relationships between individuals' worldviews and the level of their support for environmental protection initiatives. The results suggest that most respondents do not view economic growth and environmental protection as being mutually exclusive. Forcing respondents to choose one or the other of these two worldview categories appears to misrepresent individuals' worldviews. Asking respondents the dichotomous worldview question also appears to also increase item non-response. The significant item non-response and the apparent misrepresentation issue associated with use of the dichotomous worldview question brings into question the utility of such a question since individuals' worldviews are a significant predictor of their support for environmental protection initiatives.

1.0 INTRODUCTION

Individuals' pro-environmental behavior such as solid waste recycling and support for environmental initiatives, some suggest, originates from individuals' values and worldview regarding their relationship with the natural environment (Stern, Dietz, & Kalof, 1993; Stern, Dietz, Kalof, & Guagnano, 1995). Values and worldviews have been described as guiding principles that influence people towards particular actions (Petersen, Shunturov, Janda, Platt, & Weinberger, 2007; Poortinga, Steg, & Vlek, 2004; S. H. Schwartz, 1994; Stern, Dietz, Abel, Guagnano, & Kalof, 1999). Theories originating from social psychology attempt to explain pro-environmental intent and behavior while highlighting the role of people's values and worldview on their pro-environmental behavior. For example, the norm activation theory (Shalom H. Schwartz, 1977) posits that, pro-environmental actions result when an individual's personal moral norm (a person's feeling of responsibility) is activated by the belief that environmental conditions threaten entities they care about. Similarly, the value-belief-norm (VBN) theory (Stern et al., 1999) asserts that such environmental beliefs emanate from the basic values and worldviews that people hold. In short, individuals' values and worldviews appear to play a key role in shaping pro-environmental behavior. Therefore, accurate measurement and understanding of the public's environmental values and worldviews may be helpful in formulating sound environmental policy, especially policies aimed at encouraging pro-environmental behavior. With the reliance of political figures and other decision makers on polling data for formulating policy as well as researchers' use of such questions to characterize respondents and their attitudes, it seems imperative for policymakers and

others to better understand the environmental values of their constituents before going forward with policies, expenditures, and hypothesis tests.

One way to help decision makers design and implement successful environmental policies and programs is to provide them with a better understanding of how people perceive and understand the interplay and relationship of environmental and economic policies. It is widely accepted for politicians, marketers, advocates, researchers, and others to use questions in public opinion polls (surveys) to help them understand public attitudes, values, and worldviews. For instance, politicians and other policymakers may rely on a measure of their constituencies' general environmental concern to help guide them for such bond issues. Inquiries into individuals' and groups' environmental attitudes and worldviews have typically used survey methods to classify respondents as either pro-environmental protection or pro-economic growth (Carlson, 2005; Glaser & Denhardt, 1999). The most typical form of the environmental/economic worldview question presents potential respondents with a dichotomous choice question that asks them to select between one alternative favoring environmental protection and another alternative favoring economic growth (see Figure 3.1).

However, the usefulness of the dichotomous choice worldview questions has not been thoroughly examined. Some scholars suggest that, forcing respondents to choose between two policy goals prohibits individuals from indicating a socially acceptable preference for both goals or some combination of the two (Leiserowitz, Kates, & Parris,

2005). Hence, forcing survey participants to self-identify as holding either environmental protection or economic growth views may not accurately reflect their actual worldview.

Here are two statements people sometimes make when discussing the environment and economic growth. Which of them comes closer to your own point of view?

- A. Protecting the environment should be given priority, even if it causes slower economic growth and some loss of jobs
- B. Economic growth and creating jobs should be the top priority, even if the environment suffers to some extent

Figure 3.1: European and World Value Survey³ Question B008

That is, many individuals may not view the two policy goals as mutually exclusive; they may see them as complements. Other scholars have suggested that dichotomous choice questions will result in higher rates of item non-response as a result of respondents who feel their worldview is not accurately represented in the answer choice set (Ladd and Bowman, 1995; Dunlap and Rik, 1991). While Nooney et al. (2003) and others (Johnson, Bowker, & Cordell, 2004) have begun to explore the efficacy of the use of the New Environmental Paradigm [NEP] and other worldview questions, there seems to have been no reported study examining how well the typical dichotomous choice environmental/economic worldview question captures public opinion concerning the relationship between environmental protection and economic development goals.

³ The World Values Survey (WVS) is a global network of social scientists who collect survey data on the values and beliefs of the general public in more than 80 societies on the six inhabited continents. See also, <http://www.worldvaluessurvey.org/>

Therefore, this paper examines how individuals respond to alternative answer formats for the standard environmental protection or economic growth worldview question. Furthermore, the paper explores how respondents' stated environmental worldviews relate to their likelihood of support for environmental protection initiatives.

2.0 BACKGROUND

2.1 Economy versus Environment Context

The natural environment and the overall health of the economy have become prominent features on the political landscape. While few would dispute that both a growing economy and a healthy environment are desirable, policymakers often confront choices about how much to protect citizens and the environment (e.g., through regulatory actions) and how much to promote economic growth and development. As mentioned previously, such decisions have often been framed as requiring decisions to be either pro-economic growth policy or pro-environmental protection thereby polarizing and even 'demonizing' those pursuing 'the other' objective. That is, so-called "environmentalists" are portrayed as seeking environmental protection at all costs, willing to sacrifice economic development and human well-being while so-called "unbridled capitalists" are portrayed as pursuing economic growth at all costs, including irreversible environmental damage (Hoffman et al., 1999).

However, empirical evidence suggests that economic growth and environmental protection may not necessarily be mutually exclusive. For instance, Grossman and

Krueger (1995) utilize their environmental Kuznet's curve to demonstrate that economic growth may lead to increased levels of environment protection. Likewise, some state-level studies report positive correlations among state rankings of economic and environmental well being; that is U.S. states that do the most to protect their environment also appear to have the strongest economies (Hall, 1994; Meyer, 1992). Consequently, some scholars and political leaders (e.g., former President Clinton) have described the choice between environmental protection and economic growth as a false dichotomy (Feiock & Stream, 2001; Hoffman et al., 1999; Porter & van der Linde, 1995). Hoffman et al (1999) describes the relationship between economic and environmental interests as a 'mixed-motive situation'; neither purely cooperative nor purely competitive. Others have pointed out that while environmental regulation may deter some types of investment, the same regulation may encourage other types of investment and innovations that benefit firms (Feiock and Stream, 2001).

It seems that the assumption that environmental protection must cost jobs and lower profit has been repeated so often that this schism, despite arguments and evidence to the contrary, continues to influence public perceptions and attitudes. Because individuals' beliefs about economics, money, and development appear central to their environmental undertakings and actions (Hodgkinson & Iness, 2000; O'Connor, Bord, Yarnal, & Wiefek, 2002), it seems important to avoid reinforcing an unsubstantiated dichotomy between economic and environmental well being. Portraying the two goals as a dichotomy in public opinion surveys could prove inimical to efforts for garnering support for important economic and environmental protection initiatives.

2.2 Previous Economy versus Environment Survey Research

While sustainable development literature suggests that the purported conflict between the goals of environmental protection and economic growth is a false dichotomy (Cordero, Roth, & Silva, 2005; Feiock & Stream, 2001), survey questions soliciting public opinion continue to reflect a dichotomous relationship between environmental and economic goals. Typically, environmental and other survey questionnaires present respondents with a 'standard' dichotomous choice question about environmental/economic worldviews; respondents are asked if they favor environmental protection or economic growth. For instance, in public opinion polls in the United States, the Gallup Organization often asks respondents an environmental/economic worldview question with dichotomous response categories (see link <http://www.gallup.com/poll/15820/public-priorities-environment-vs-economic-growth.aspx>).

The Gallup results have indicated general support for environmental protection over economic growth among the public until recently. About 65% to 71% of respondents favored environmental protection during the 1990s but that public support for the environment seems to be diminishing significantly; perhaps in response to difficult economic times (Carlson, 2005). In their study to determine community support for selected local development strategies, Glaser and Denhardt (1999) noted that majority of respondents tend to favor environmental protection when forced to choose between environmental protection and economic growth. They reported that, about 60.2% of respondents assigned greater importance to environmental protection (in their case curbing water and air pollution) than economic development. The World Values Survey

[WVS] uses a very similar dichotomous-response choice question in order to measure respondents' environmental/economic worldview. The most recent WVS found that 54 percent of their worldwide sample (56% of G7 countries' sample) answering the question selected the response that 'Protecting the environment should be given priority, even if it causes slower economic growth and some loss of jobs' (World Values Survey, 2009). However, that same WVS reports that 16.2% of individuals taking the survey in all participating nations (15.3% in the G7 nations) did not select one of the two answer choices but rather provided another answer, a 'don't know' response, or simply failed to provide an answer to the survey item.

While the dichotomous choice environmental/economic worldview question may provide an avenue for understanding changes in public values about the environment over time, the appropriateness, efficacy, and usefulness of this dichotomous format question for assessing a sample populations' environmental/economic worldview merits inquiry. Hand and Macheski (2003) argue that the dichotomous response choice question fails to capture how most individuals think about the relationship between the environment and the economy by prohibiting respondents from stating their 'real' preference for both. Their study revealed a higher proportion of respondents (84.5%) indicating a preference for both environment and economy. In another study, nearly three quarters of respondents held a view that there should not necessarily be a choice between only environmental protection and economic growth (Ladd & Bowman, 1995). Ladd and Bowman also noted that public opinion polling that employs dichotomous response choice questions is often associated with higher percentages of respondents opting for an 'I don't know'

alternative. Previous research suggests that use of the dichotomous answer set for environmental/economic worldview questions merits further inquiry.

Survey methodological research provides several possible reasons respondents may choose to not answer a dichotomous choice question such as the environmental/economic worldview questions. These possible reasons include a respondent's lack of knowledge on the issue in question; ambivalence due to contradictory thoughts or feelings about the subject matter; a desire for self-image protection and/or satisficing where respondents deem efforts required to answer the question to be so great and thus choose not to answer (Groves, Dilman, Eltinge, & Little, 2002; Krosnick, 2002). Non-responses can also result from respondents' difficulty in translating their judgment on the issue onto the response choices offered for a question. Krosnick (2002) explains that, a respondent who has some information on an issue and generally has an overall neutral orientation towards it, when asked a question without the neutral response option might refuse to answer because the answer he or she would like to give has not been conferred legitimacy. In the instance of environmental/economic worldviews, respondents who view the two policy goals of environmental protection and economic growth to be complementary, when presented with a dichotomous response choice may be forced to opt out. The critiques of the dichotomous response choice question format for environmental/economic worldviews motivate our examination of the question format to accurately capture the environmental/economic worldview of respondents.

3.0 METHODS

3.1 Research Questions

This paper explores the impact and relevance of providing respondents with a middle option allowing them to indicate a preference for both economic growth and environmental protection goals. Specifically, the study addressed the following questions:

1. How do the distributions for the responses “economic growth” and “environmental protection” of the standard dichotomous choice worldview question compare with the responses to the same worldview question that also includes an additional response option indicating preference for both policy goals?
2. Does presenting the environmental protection-economic growth worldview question as a dichotomous choice question impact item non-response?
3. Do people’s stated views concerning policy goals of environmental protection and economic growth significantly relate to their stated level of support for environmental protection initiatives?

3.2 Study Site

This study was conducted on the campus of Michigan State University [MSU], a large Tier 1 public university in the Midwest of the United States. The university has a long tradition of using the research and knowledge it generates to create practical solutions for

individuals and communities across Michigan and around the world. The university community shares a number of defining characteristics similar to the general population. The campus community is highly educated, has a broad age range, and has personal income distribution generally at the low end of the range for students, at the middle to higher end of the range for staff/faculty. As a public university, MSU attracts students, staff, and faculty from diverse ethnicity, socioeconomic status, academic and professional interests.

3.3 Participants and Sampling Procedure

The university has about 10,000 graduate and professional students, more than 35,000 undergraduates, and about 10,000 faculty and staff. A stratified random sample of 15,652 potential participants was drawn for the university's three principal constituencies—students, faculty and staff.

3.4 Survey Design and Implementation

The survey was designed and administered as a web-based instrument. Members of the study's target population all have daily access to university-based e-mail/internet and they are expected to use email/internet resources daily for their study, work, and other campus-based activities. As part of a larger campus sustainability planning effort, the multi-sectional survey was constructed to examine campus recycling behavior, recycling program preferences, and communication strategies. The standard environmental/economic worldview question was initially included with other items that sought to help researchers understand the preferences, knowledge and attitudes of the

university community. Researchers developed the survey using an iterative process including key informant interviews and focus group discussions (M. Kaplowitz, Lupi, & Hoehn, 2004). In pretesting the survey, focus group and individual interview participants consistently articulated their frustration with the ‘standard’ environmental protection versus economic growth question. Pretest participants repeatedly asked for some type of third alternative that would allow them to more accurately express their opinion on the issue. That feedback provided a catalyst for designing the experiment that is the basis of this study. Hence, the final web-survey was programmed so that a random 2/3rd of participants were asked to indicate their environment/economic worldview by responding to the “standard” dichotomous choice question (see Figure 3.2) while 1/3rd of respondents were asked to respond to the same question using an ‘alternative’ three answer-choice set (see Figure 3.3). Besides the environmental worldview question (Figure 3.2 and 3.3), all study participants were asked the same substantive questions about their knowledge and attitudes towards current campus environmental initiatives, and questions about alternative recycling programs.

Here are two statements people sometimes make when discussing the environment and economic growth. Which of them comes closer to your own point of view?

A. Protecting the environment should be given priority, even if it causes slower economic growth and some loss of jobs

B. Economic growth and creating jobs should be the top priority, even if the environment suffers to some extent

☐ A

☐ B

Figure 3.2: ‘Standard’ Question-Dichotomous Answer Choices

Here are two statements people sometimes make when discussing the environment and economic growth. Which of them comes closer to your own point of view?

A. Protecting the environment should be given priority, even if it causes slower economic growth and some loss of jobs

B. Economic growth and creating jobs should be the top priority, even if the environment suffers to some extent

C. Both

☐ A

☐ B

☐ C

Figure 3.3: “Alternative” Question-Three-Answer Choices

The survey was implemented in November 2007 following the Dillman Tailored Design Method (Dillman, 2007). Invitations, follow-up invitations, and final invitations were all designed following best practice principles and guidelines suggested by Dillman. Data analyses included computation of the mean response to each survey item, a comparison of the response distribution and response rates between the two worldview question using chi square test and regression analyses investigating the relationships between respondents stated worldview preferences and their level of support for environmental initiatives.

3.5 Regression Model

A regression model was developed to investigate the impact, if any, that respondents' environmental/economic worldview preferences and their other characteristics have on their stated level of support for environmental protection initiatives. First, respondents were classified into five groups of "worldview" depending on their 'worldview' response and the response treatment to which they were assigned. The name assigned to each group - Environment(AB), Economy(AB), Environment(ABC), Economy(ABC) and Both(ABC) - denotes respondents' 'answer' and the answer choice set they received. For example, individuals coded as Environment(AB) selected environmental protection when asked the worldview question that had two responses option (response treatment AB). The groups were then coded for the regression analysis. The "Both(ABC)" response/worldview category was dropped from the regression and thus serves as the baseline worldview category against which regression results can be interpreted. The regression model used for the analyses is:

$$\text{EPI}_i = \beta_0 + \alpha_1 \text{Env(AB)} + \alpha_2 \text{Env(ABC)} + \alpha_3 \text{Econ(AB)} + \alpha_4 \text{Econ(ABC)} + \beta_1 \text{PSE} + \beta_2 \text{KEB} \\ + \beta_3 \text{REI} + \beta_4 \text{SCI} + \beta_5 \text{Age} + \beta_6 \text{Gender} + \beta_7 \text{Income} + \varepsilon_i$$

where the environmental protection index [EPI, explained below] is the dependent variable and the independent variables include five worldview groups, perceived self-efficacy [PSE], knowledge of environmental benefits [KEB], receptivity to environmental information [REI], satisfaction with current environmental initiatives [SCI], age, gender and income.

3.5.1 Environmental Protection Index [EPI]

Participants' support for environmental protection initiatives was measured using a simplified version of the Inglehart (1995) environmental protection index [EPI], a measure of support for environmental undertakings. Respondents were asked to use a five-point scale (1='strongly disagree' to 5= 'strongly agree') to indicate their level of agreement with the following three statements: 1) *I would be willing to give part of my income if I were sure that the money would be used to prevent environmental pollution;* 2) *The government should reduce environmental pollution, but it shouldn't cost me any money;* and 3) *Protecting the environment and fighting pollution is less urgent than often suggested.* The EPI was computed as a sum of the responses of these three items subsequently enabling respondents to be classified as 'high,' 'neutral,' or 'low,' supporters of environmental protection efforts. The three items were intercorrelated, yielding a Cronbach alpha of 0.54 in the reliability analysis.

3.5.2 Perceived Self-Efficacy [PSE]

Bandura's (1977) theory of self efficacy suggests that people's ability to successfully execute an action is determined by their belief in their ability to do so. That is, if people have a strong belief in their abilities to effect changes in the world around them, they will develop more effective coping strategies and higher levels of achievements than those who do not. Heath and Gifford (2006) go on to suggest that the belief that the things one does makes a difference is a prerequisite for the willingness of an individual to initiate any personal action. These self-efficacy theories suggest that individual's with strong beliefs in their ability to effect positive environmental change will be more willing to support pro-environmental initiatives. The survey design allowed for respondents' perceived self-efficacy [PSE] to be measured using respondents answers on a five-point Likert-type scale ('strongly disagree' to 'strongly agree') indicting their level of agreement with following statement: *If I recycle at Michigan State University, it has a positive effect on the environment.* A higher level of agreement was interpreted as denoting a higher level of perceived self-efficacy.

3.5.3 Knowledge of Environmental Consequences/Benefits of Action [KEB]

Environmental knowledge consists of factual information people possess concerning the state of the environment and the influence of human actions on the environment (Arcury & Johnson, 1987). It is generally believed that increased environmental knowledge will result in increased environmental concern and, in conjunction with knowledge of pro-environmental strategies, may be translated into appropriate pro-environmental

behavior (Bradley, Waliczek, & Zajicek, 1999). Indeed, previous studies have identified environmental knowledge as a significant predictor of pro-environmental intent and behavior (Barr, Nicholas, & Gilg, 2003; Vining & Ebreo, 1990). These studies suggest that if people become more knowledgeable about environmental problems then they will be more motivated to act in an environmentally beneficial ways as well as be more inclined to support environmental protection policies. Therefore, we hypothesized that respondents' support for environmental protection initiatives [EPI] would increase as respondents' knowledge of the environmental benefits increased. To be able to test this, we asked survey respondents to rate their knowledge of the environmental benefits of recycling using a five-point Likert-type scale and included this knowledge of environmental consequence variable in our model.

3.5.4 Receptivity to Environmental Information [REI]

Another facet that complements individuals' extant knowledge of environmental issues is the level of their receptivity to new or additional environmental information. Stern et al. (1995) noted that values and worldviews act as filters for new information so that congruent attitudes and beliefs are more likely to emerge. People tend to gravitate towards and be more receptive to information that is consistent with their pre-existing values and beliefs. In line with this, several studies have found that individuals with a favorable view of recycling were more likely to seek information about the environment (Granzin and Olsen, 1991; Jennings 2004). Therefore, we hypothesized that individuals indicating higher degrees of receptivity to environmental information would be more supportive, all else equal, of environmental protection initiatives. To assess survey

respondents' willingness to receive environmental (recycling) information, the survey asked them to use a five-point scale to indicate how strongly they agree or disagree with the following statements: "*I would like to learn more about the benefits of recycling,*" and "*I would like more information on how to recycle materials properly.*" Responses to these two statements were subsequently combined into an REI index with a Cronbach alpha of 0.78.

3.5.5 Satisfaction with Current Environmental Initiatives [SCI]

Individuals' satisfaction with prevailing environmental conditions and initiatives has been asserted as a factor influencing individuals' support for proposed environmental protection. Prester et al. (1987) observed that individuals' dissatisfaction with the conditions of the environment and their expectation of positive changes in the quality of their environment increased their subsequent level of participation in environmental initiatives including activism (writing protest letters, signing petitions, taking part in demonstrations, attending public information meetings). Years later, Pelletier et al. (1996) used an environmental satisfaction scale to examine the role of respondents' satisfaction with local environmental conditions and governmental environmental policy as a predictor of subsequent pro-environmental behavior. Pelletier et al. reported that higher levels of satisfaction with environmental conditions seemed to be associated with a lower frequency of providing financial support to pro-environmental groups and a lower frequency of voting for a particular political party because of its environmental stance. At the same time, they found that other pro-environmental initiatives--signing

petitions, involvement with an environmental group and writing letters of complaint to companies--decreased as satisfaction with the environment increased. Thus, we hypothesized that current individuals' willingness to support additional environmental protection efforts would decrease as their level of satisfaction increased for current environmental programs. To measure respondents' level of satisfaction with current environmental programming, they were asked to indicate their level of agreement with the statement *'I am satisfied with the current MSU recycling program'* using a five-point scale from 'strongly disagree' to 'strongly agree'.

3.5.6 Demographics

Demographic characteristics of respondents such as gender, age and income were also collected and used in this study. A number of previous studies have explored the role of demographic characteristics on environmentally responsible behavior. Evidence of the influence of such demographic characteristics on respondents' environmental concern has been equivocal. Some studies indicate a positive association between income, age and gender on environmental concern while others show a negative or weak associations (Oskamp et al., 1991; Vining & Ebreo, 1990). Recently, Gelissen (2007) found individuals' willingness to make financial sacrifices to support environmental protection was positively related to income but negatively related to age. O'Connor et al. (2002) found gender to be irrelevant in separating emission reduction supporters from non-supporters.

4.0 RESULTS

This section presents results from the comparison of response distributions and item non-response rates between the two environment/economy worldview questions and regression analyses aimed at answering the research questions.

4.1 Response Rates

In total, 15,652 survey invitations were sent to 12,108 students, 1,481 faculty and 2,063 staff (about 30 percent of the MSU community). Of those invitations, 182 were determined to have been sent to incorrect/ineligible addressees. At the close of the survey, 3922 individuals had participated in the study resulting in an overall American Association for Public Opinion Research (AAPOR) minimum response rate (RR1) for the study of 24.9 percent (AAPOR, 2006) with response rate variations across the three groups. Staff responded at a higher rate (42.8%) than faculty (38.0%) and students (20.2%). These response rates were significantly different across students, faculty, and staff groups [$\chi^2(2, n=15652)=630.85, p<0.001$]. The gender of respondents was approximately 58% females and 42% male varying only slightly from overall university demographics; a higher proportion of staff (67%) and students (57%) respondents were female and majority of faculty respondents were male (59%), which also roughly mirrors the demographics of the university community.

4.1.1 Worldview Question Non-Response

The literature suggests that a question that forces survey participants to make a choice between environmental protection and economic growth may be associated with higher item non-response rates (Dunlap & Rik, 1991; Ladd & Bowman, 1995). To test this, we compared the item non-response for the two versions of the environmental/economic worldview question-the standard version (AB) and the revised version (ABC) (See Figures 3.3 and 3.4). Overall, 3922 respondents were randomly assigned to one of the two versions of the worldview question-2625 participants to response treatment AB and 1297 participants to response treatment ABC⁴. A total of 140 participants assigned to treatment AB and 66 participants assigned to treatment ABC started but did not finish the survey (about 5% of participants assigned to each treatment). These 206 potential respondents were excluded from the item non-response rate calculations. As Table 3.1 shows, the aggregate item non-response rate for the worldview question is 1.7%. However, the item non-response for treatment AB was statistically greater (2.3%) than that of treatment ABC (0.6%)($\chi^2(1, 3716)=14.0, p<0.001$). This finding supports the hypothesis that not offering potential respondents a response choice 'between' or other than exclusive environmental protection or economic growth will result in increased item non-response.

⁴ The proportionate but unequal assignment of respondents to the question treatment groups was used to ensure comparability of results from WVS and Gallup survey. All statistical tests reported took the disproportionate assignment to the treatment groups into account.

Table 3.1 Worldview Item Non-Response

Question Treatment	Total	Complete	RR ^δ	Non-response	NRR**
AB	2485	2429	97.7%	56	2.3%
ABC	1231	1224	99.4%	7	0.6%
Total	3716	3653	98.3%	63	1.7%

^δAAPOR Minimum Response Rate (RR01)

** Non-response Rates, statistically different at 99% level, ($\chi^2(1, 3716)=14.0, p<0.001$)

4.2 Environmental/Economic Worldview

The response distribution for the two treatments AB and ABC is presented in Figure 3.4. The results reveal respondents' selection of the environmental protection goal (73.5%) more often than the economic growth goal (26.5%) when faced with a dichotomous choice between those two policy goals. However, such a strong selection of the environmental protection goals was not evident when participants were offered the third response option of "both." For those receiving response treatment ABC, most respondents indicated their preference for both policy goals (62%) with less than a third (30%) selecting environmental protection and less than one-tenth (8%) of respondents selecting economic growth as the preferred policy goal. That is, a majority of the respondents in the ABC treatment do not seem to view the goals of environmental protection and economic growth as mutually exclusive.

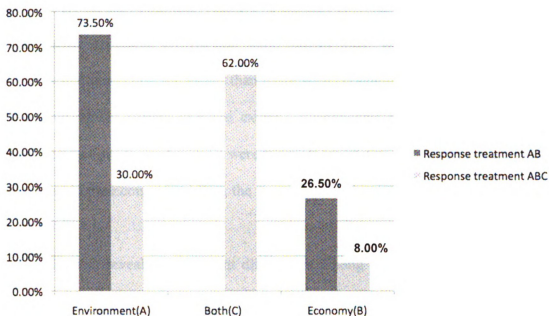


Figure 3.4: Response Distribution by Response Treatment

4.3 Worldview and Environmental Protection Index

Table 3.2 presents the results of the regression analysis investigating the impact of individual environment/economic worldview on their support for environmental protection initiatives. The reported coefficients of the worldview categories are the relative differences from the baseline point. For instance, the coefficient for Environment(ABC) indicates a higher score on EPI relative to Both(ABC) while that of Economic(ABC) suggest a lower level of support relative to Both(ABC).

In general, the results indicate that the environmental/economic worldview of participants is predictive of their level of support for environmental protection initiatives. The overall model was able to account for about 25.2% of the variance in EPI, $F(11, 3459)=106.99$, $p<0.001$. About half of this explained variance (13%) was attributed to respondents'

worldviews. As expected, individuals who support environmental protection “even if it causes slower economic growth and some loss of jobs” were more likely to support environmental protection initiatives than those with economic growth worldviews “even if the environment suffers to some extent.” Respondents in the Environment (ABC) group (‘strong environment group’) were the most supporters of environmental initiatives while those in the Economic (ABC), the ‘strong economy group’ were least supportive.

The results also revealed significant differences among the worldview groups in their support for environmental protection initiatives. In the case of response treatment ABC, the results indicate a significant decrease in EPI score for respondents with pro-economic worldview (Economic ABC) relative to those favoring both policy goals [Both (ABC)] as depicted by their negative regression coefficient (Table 3.2). On the other hand, respondents evidencing a pro-environmental worldview (Environment ABC) were associated with a significantly higher EPI scores compared with those in Both (ABC). Further analysis revealed that respondent’s support for environmental initiatives among the pro-economic and pro-environment group in the standard dichotomous response question (Treatment AB) is significantly different from their counterparts who responded to treatment ABC. Perhaps, by presenting respondents with the dichotomous question, some respondents who would have indicated a preference for ‘both’ are forced into either category thereby moderating the resulting impact of each worldview category on the level of support for environmental initiatives.

Table 3.2 Results for respondents' environmental protection index regressed on worldviews, perceived efficacy, receptivity to information, satisfaction with current initiatives, and environmental knowledge.

Independent variables	β ¹	Std. error	t
Worldview‡			
Constant	5.157	.314	16.405***
Environment(ABC) ^a	1.002	.138	7.255***
Environment(AB) ^b	.759	.093	8.146***
Economics(ABC) ^c	-1.446	.232	-6.224***
Economic(AB) ^d	-.784	.115	-6.844***
Perceived self efficacy [PSE]	.514	.055	9.276***
Knowledge Environmental Benefit [KEB]	.342	.039	8.658***
Receptivity to information [REI]	.242	.023	10.709***
Satisfaction w/Current Initiative [SCI]	-.342	.039	-8.886***
Average income	7.256E-6	.000	5.779***
Gender	.087	.073	1.196
Age	7.644E-5	.004	.020

Adjusted R² = 25.2 *** p< 0.001, **p< 0.05

‡ Worldview variables represent discrete treatment and response options.

AB indicates a treatment providing two answer choices--environment and economy.

ABC indicates a treatment providing three answer choices--environment, economy, and both, where Both(ABC) is the baseline against which the other worldview variables are measured.

¹Worldview groups with different letters (^a, ^b, ^c) are statistically different from each other at the 95% level. That is, the two environment treatments, while different from each other, differ from Both and the two economic treatments.

4.4 Other Determinants of Support for Environmental Protection

Results of the relative effect of respondents' perceived self-efficacy [PSE], knowledge of environmental benefits [KEB], receptivity to environmental information [REI], satisfaction of existing environmental initiatives [SCI], and their demographic variables on their level of support of environmental protection initiatives is also presented in Table 3.2. Respondents' PSE, KEB, REI, and their SCI significantly influenced their support for environmental initiatives in the hypothesized direction. Higher levels of PSE had a significant and positive relationship with individuals' level of support for environmental protection. Likewise, respondents' KEB as well as their REI were significantly and positively associated with respondents' higher levels of support for environmental protection. At the same time, increasing SCI was negatively associated with support for environmental initiatives. That is, respondents that are very satisfied with the status quo of environmental protection were less likely to desire increased environmental protection undertakings. Besides participants' economic/environment worldview, their PSE was the strongest predictor of EPI. A unit change in respondent's PSE score was associated with a greater change in EPI score ($\beta = .514$ $p < 0.001$) than a unit change in SCI ($\beta = -.342$ $p < 0.001$), KEB ($\beta = .342$ $p < 0.001$) and RCI ($\beta = .242$ $p < 0.001$). For the demographic characteristics, only income ($\beta = 7.256 \times 10^{-6}$ $P < 0.001$) was a significant explanatory variable for increased support for environmental initiatives.

5.0 Discussion

The reported results examined a diverse university community's environmental values, attitudes, and beliefs as well as its stated views on the policy goals of environmental protection and economic growth. The results suggest some merit in providing respondents with at least a middle option when assessing their environment/economic worldview. First, the observed differences in response distribution between the standard dichotomous response choice question and the alternative question that had an option to indicate a preference for both suggests researchers risk overestimating the actual economic/environment worldview of respondents by employing the dichotomous response choice question. The results show that, a majority of respondents selected some mid point between all environmental protection and all economic growth when given a chance rather than the overwhelming majority who selected environmental protection when only given dichotomous response choices. Thus, decisions based on the results of the dichotomous response choice question concerning environmental and economic policy preferences will fail to account for the heterogeneity of respondents' environmental/economic worldview.

Moreover, as the subsequent analysis reveal, the alternative question allowed for a self-identification of a large group of respondents that has significantly different policy preferences and attitudes from the two proffered, mutually exclusive worldviews. However, by forcing respondents into either of the two goals by way of the standard dichotomous response question, this distinct middle category of respondents with

different policy preference is not captured leading to a oversimplified estimate of respondents worldview. The finding that those respondents expressing a pro-economic [pro-environment] view in response treatment AB differed in their policy preferences, [as measured by their EPI] from those evidencing similar view in response treatment ABC evidences this potential oversimplified estimation.

These findings have useful implications for environmental policy formulation. They suggest that policymakers and elected officials basing their political decisions on the standard dichotomous response choice may end up with inaccurate information about their constituents' true policy priorities. From the results of the standard dichotomous question, policymakers would have concluded that about two-thirds of their constituents would support/prefer environmental regulatory measures over? economic development programs while in fact their constituents are more heterogeneous, with majority equally favorable to both policies. In doing so, policymakers and elected officials could be misled to overemphasize environmental protective measures to the detriment of economic growth, while their constituents would prefer a balance between the two goals.

Additionally, the public in states across the United States has been asked by policymakers to consider financing through bond issues important environmental protection activities. Typically, these bond issues require a majority vote in a state-wide ballot to pass measures to raise funds to protect wildlife habitat, restore fisheries, etc. The results of our study highlight the potential pitfall of relying on the standard dichotomous environmental value question for gauging public support. That is, our results show how a vast majority

of support (74%) expressed in the dichotomous choice answer format might mask an underlying support that may well be less than half of that (30%). In other words, concluding that an overwhelming majority of the public will vote to support such bond issue as indicated by the results of dichotomous response choice format will be an overstatement of the public's support.

Furthermore, in line with previous research (Dunlap & Rik, 1991; Ladd & Bowman, 1995) the use of an additional response category, alternative response treatment (ABC), also resulted in a decreased item non-response rate (as compared to the standard response rate version of the question). While a host of factors may account for item non-response (See Groves et al., 2002), in our study, all of those factors as well as others were held constant. Perhaps, in line with Krosnick (2002), respondents who neither identified with the exclusive pro-economic or pro-environment worldview chose to opt out or respondents who did not see environmental and economic policy goals as mutually exclusive opted out as well.

The results also highlight the relative importance of respondents' worldview and other personal characteristics such as their perceived self-efficacy, environmental knowledge and satisfaction with the current environmental initiatives as predictors of pro-environmental intent. Like previous studies (Stern et al., 1999; Stern et al., 1995), respondents worldview was indicative of their level of support for environmental initiatives. Participants holding pro-environment worldview (Environment AB and Environment ABC) were more likely supporters than those with pro-economic

worldview. Also, as hypothesized, participants levels of support for environmental protection initiatives was positively associated with their PES, KEB, REI and income while negatively related to SCI. These observed relationships could be explained by the nature of environmental problems. Perhaps given the diffused and seemingly distant nature of environmental problems, which often require several actors to address, individuals belief in their ability to make significant contributions [as captured by the PES] was essential to motivate any kind of support. Such beliefs are informed, in part, by a basic understanding of why, how and what regarding the said environmental problems (Barr et al., 2003; Folz, 1999; McDonald & Oates, 2003; Tucker, 1999). Thus, individuals with high levels of PES, KEB and REI could have been more motivated to support environmental initiatives. Similarly, in concert with Pelletier et al. (1996) findings, those who are satisfied with current environmental initiatives will be less motivated to support additional efforts towards environmental protection. Although often neglected when researchers examine determinants of environmental concern and behavior, our results suggest that individuals' satisfaction with prevailing environmental conditions and initiatives may be a fruitful predictor of pro-environmental intents.

Generally, the demographic variables of age and gender were not significant predictors of support for environmental protection. This could be attributed to a widespread environmental concern within our population. Perhaps, by virtue of their relatively high educational levels, participants may have been exposed to a wide range of environmental information, which possibly could induce some degree of environmental concern across the age groups and gender. The insignificant effect of gender could be because the

behavior considered, support for environmental initiatives, poses no direct risk to participants. On the other hand, the marginal effect of income could be explained by the items in the EPI index, which included items assessing participants' willingness to make financial sacrifices in favor of the environment. Since willingness to make financial sacrifice is dependent on one's ability to pay, an income effect on EPI is understandable for our population with significant differences in income.

6.0 Conclusion

An accurate measurement and understanding of the public's values, attitudes and beliefs is essential to formulating sound environmental policy. It is in this light that we have examined the efficacy of the dichotomous response choice question to capture a diverse campus populations' environment/economic worldview. Specifically, we have examined responses to the standard dichotomous response choice question and an alternative question that allows for a preference for both goals as well as how the stated-worldview preferences relates to their support for environmental protection initiatives.

The results and analysis of the two response-options versions of the worldview question revealed that important information may be missing for a significant number of respondents when they only have two answer choices. It suggests that individual's economic/environmental worldview is more heterogeneous than the two proffered mutually exclusive categories represented by the dichotomous response question. Therefore, forcing respondents into one of the two categories by way of the dichotomous

response choice question will lead researchers to overestimate respondents' worldview. Moreover, doing so could potentially cause those respondents who may view the relationship as complementary to not answer the survey question. These findings suggest merits in providing respondents with a third or more response choices in questions soliciting the public's environmental/economic worldviews.

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CHAPTER 4

CONCLUSION

The success of campus sustainability efforts, such as campus solid waste recycling programs requires sustained participation of university community members in pro-environmental behavior. It is therefore essential to design and implement strategies that will minimize the barriers to recycling and promote greater levels of participation. Such strategies may benefit from improved modes of communication as well as a better understanding of potential participants' worldviews. The first reported research project focused on examining the relative attractiveness and perceived efficacy of available communication media as well as the information needs of the three principal campus constituencies. The results provide useful insights, which can help university administrators design an effective communication strategy for a new recycling program. While the results and the resulting recommendations apply directly to recycling at MSU, the findings may be useful to decision makers and researchers in other settings, particularly those developing policies and programs that integrate, improve, and contextualize environmental education for varied constituencies.

First, the communication study revealed recycling knowledge gaps that could potentially inhibit recycling participation. The results show that respondents have a general lack of knowledge of what to recycle, where to recycle and how to recycle. While knowledge may not be a sole determinant of recycling participation, the literature reports of increases in recycling participation when publicity efforts has focused on where, what and how to recycle (DoValle, et al., 2004, Folz, 1999, Kelly, et al., 2006, McDonald and Oates, 2003,

Tucker, 1999). It is therefore important for program implementers to first focus on addressing these knowledge gaps among their target populations. Besides, educational efforts, a possible way to address the knowledge gaps is to improve recycling logistics such as recycling bins at convenient locations for stakeholders. This will not only help improve the knowledge gaps associated with where to recycle but also increase the overall convenience of the recycling program.

Secondly, the findings from the communication study highlight the need for program implementers to differentiate educational program characteristics based on target audience. The results revealed significant differences in preference for and perceived effectiveness of proposed communication media among the three stakeholders. For instance, while students highly favored promotional campaigns to promote recycling participation, faculty and staffs prefer personal contact. This suggests that no single mode of communication will be effective in reaching out to all stakeholders. Therefore, proposed publicity approaches will need to differentiate their mode of delivery based on the target audience. The results also underscore the need for program designs to actively seek the input of target populations. Without a proactive approach to garner stakeholder's input, program implementers will invariably fail to recognize any differences in communication pattern. Failure to account for difference between groups of stakeholders could affect the overall effectiveness of their communication strategies.

Given the important role stakeholders' views play in environmental policy/program design and success, an accurate measurement and understanding of such views and

concern is critical. The second reported research project thus sought to better understand the appropriateness of using the 'standard' dichotomous answer choice format which has been widely used in eliciting the environmental/economic worldview of respondents. The results suggest that individual economic/environment worldview is an important determinant of their support for environmental initiatives. This finding underscores the importance of accurately measuring/understanding peoples' environmental/economic worldview. Efforts to better measure respondents 'true' worldviews as they relate to prioritizing economic growth and/or environmental protection is an important area of scholarly activity which can aid in advancing the agenda towards pro-environmental behavior and sustainable development.

Furthermore, the study revealed that, environment/economic worldviews are more heterogeneous than the results of worldview questions with mutually exclusive dichotomous response categories may suggest. The use of the dichotomous response choice question, which forces respondents to choose between either prioritizing economic growth or environmental protection, may not accurately capture the worldview of many respondents. Our results show that the use of the dichotomous choice question may lead to an overestimate/underestimate of respondents' worldviews and provide policymakers with inaccurate information. Similarly, the increased item non-response to worldview questions with only two choices may also erroneously inflate results.

The results from this study suggest that an alternative approach in eliciting environment /economic worldviews is to provide respondents with a continuum of choices. This study

suggests that using a worldview question with a third answer option (e.g., “both”) would be a better measure of respondents’ actual worldview than the typical dichotomous response choice worldview question. This begs the question of whether increasing the number of choices or assessing individual worldview in a continuum could further improve the worldview measure. Future research should investigate this effect. For instance, individual environment/economic worldview could be measured on a five point Likert scale and the result compared with that of three response choices used in this study, within the same population. It will also be interesting to know how individual stated environmental/economic worldview affects their level of support for specific environmental initiatives. Support for different environmental initiatives will elicit different levels of efforts and resources from individuals. Thus, it could be argued that regardless of one’s environment/economic worldview, an individual level of support for initiatives requiring lesser resource commitments such as participation in a recycling program may differ from those requiring relatively greater commitments and somewhat operationalize the environment-economic tension such as increases in taxes to protect wetlands.

In addition, while revealing some important determinants of individual support for environmental initiatives, the model explained only 25% of the variance in the support for environmental initiatives. Future studies should therefore consider refining the model to increase its predictive power. One way is to refine the measures used to assess participants’ personal variables such as environmental knowledge. Considering the multifaceted nature of the independent variables, it is difficult to adequately measure

them in a single survey statement. Future studies should consider using multiple survey questions for each variable to help improve on their measure. Other potential predictor variables such as social norms could also be included in the model to improve its prediction.

Furthermore, although the communication study generally depicts a lack of knowledge among participants in certain aspects of the recycling program, it does not clearly show how this lack of knowledge actually affects their participation in the program. Understanding how each of these knowledge areas affect subjects participation will provide a more compelling argument regarding the knowledge gaps publicity campaign should address. The study could further be developed to include this research component to help refine the recommendations. In addition, the broad classification of the available publicity media into five categories reduces the specificity of recommendations regarding the choice of publicity media. For instance, media ads included items such as billboards, radio spots, signs at athletic events and television commercials. The items within any single category may vary in their usefulness and effectiveness to reach out to participants. This forces program implementers to further decide on which media to employ within each broad category. Future research could thus make use of a more narrow and specific grouping.

Nevertheless, valuable information has been learned. These studies have helped identify possible knowledge barriers that could prevent the success of recycling programs, the types of publicity media that could effectively deliver recycling information, and the need

to differentiate educational program characteristics based on target audience. It has also revealed potentially useful determinants of support for environmental initiatives while providing a foundation for further research into the efficacy of worldview measures employing dichotomous response choices to accurately capture individuals view.

APPENDICES

Appendix 1: Select Survey Questions

Recycle Survey
Page 1 of 1

22. How knowledgeable are you about the range of paper products that may be recycled at [redacted]?

Not At All Knowledgeable	Somewhat Knowledgeable	Very Knowledgeable
☐	☐	☐

23. How knowledgeable are you about the range of environmental benefits associated with recycling?

Not At All Knowledgeable	Somewhat Knowledgeable	Very Knowledgeable
☐	☐	☐

24. How knowledgeable are you about the different places on campus where you can recycle liquid and food containers (e.g. plastic bottles, and cans)?

Not At All Knowledgeable	Somewhat Knowledgeable	Very Knowledgeable
☐	☐	☐

25. How knowledgeable are you about the range of waste-reduction strategies that you, as an individual, can take part in on the [redacted] campus?

Not At All Knowledgeable	Somewhat Knowledgeable	Very Knowledgeable
☐	☐	☐

26. Which of the following, if any, do you think would increase recycling on campus the most?

- ☐ More recycling containers around campus
- ☐ Competitions between the different colleges
- ☐ Competitions between different buildings
- ☐ Peers and colleagues that regularly recycle
- ☐ Regular updates and tips on the program
- ☐ Other:

Back
Next

Restart the survey

We just have three more pages for you.

35. Publicity Campaigns

How effective do you think the following publicity campaigns will be?

Posters Posters and flyers around campus, on bulletin boards, in student mail, etc.

Very Ineffective
Ineffective
Neither Effective/Ineffective
Effective
Very Effective

☐ ☐ ☐ ☐ ☐

Media Ads State News ads, billboards, radio spots, signs at athletic events, and campus TV commercials.

☐ ☐ ☐ ☐ ☐

Technology and Publicity Text messaging, You Tube, My Space and Facebook pages, websites, and e-mail messages.

☐ ☐ ☐ ☐ ☐

Personal Contact People, like mentors and building staff, to explain the new program in hall and department meetings.

☐ ☐ ☐ ☐ ☐

Promotions Recycling contests, competitions among colleges, departments, or residence halls, t-shirt giveaways, etc.

☐ ☐ ☐ ☐ ☐

 [Back](#)

[Next](#) 

[Restart the survey](#)

There is one more page after this.

To get a better idea of the [REDACTED] community's attitudes about recycling and environmental policy, we would like to know how strongly you agree or disagree with the following statements?

	Strongly Disagree	Disagree	Neutral	Disagree/Agree	Agree	Strongly Agree
36. I am very satisfied with the current recycling program at [REDACTED]	☐	☐	☐	☐	☐	☐
37. If I recycle at [REDACTED] it has a positive effect on the campus environment.	☐	☐	☐	☐	☐	☐
38. In general, it takes a lot of time and effort to recycle at [REDACTED]	☐	☐	☐	☐	☐	☐
39. I would like to learn more about the benefits of recycling.	☐	☐	☐	☐	☐	☐
40. I would like more information on how to recycle materials properly at [REDACTED]	☐	☐	☐	☐	☐	☐
41. I would give part of my income if I was certain that the money would be used to prevent environmental pollution.	☐	☐	☐	☐	☐	☐
42. The government should reduce environmental pollution, but it should not cost me any money.	☐	☐	☐	☐	☐	☐
43. The U.S. cannot solve its environmental problems by itself, but needs to collaborate with international environmental organizations.	☐	☐	☐	☐	☐	☐
44. Protecting the environment and fighting pollution is less urgent than often suggested.	☐	☐	☐	☐	☐	☐

 **Back**

Next 

[Restart the survey](#)