

DETERMINING SUSTAINABLE WASTE MANAGEMENT  
PRACTICES IN COLLEGE AND UNIVERSITY DINING  
SERVICES USING THE THEORY OF PLANNED BEHAVIOR

By

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## **Abstract**

Along with increasing environmental challenges and large quantities of energy demand, many have become concerned about the environment and have implemented “Going Green” strategies. As a result, plans for sustainable development are being adopted by governments, institutions, operations, and individual households.

Many National Association of College & University Food Service (NACUFS) members may have heard about sustainability, but they may not apply their knowledge to developing practical outcomes and solutions. Very little research has been published that measures how NACUFS members are responding to Sustainable Waste Management (SWM) and to the new Sustainability Guide published by the NACUFS organization in September 2009.

The primary purposes of this study were to ascertain what SWM programs have been implemented in college and university foodservices operations and determine how NACUFS members’ attitudes, subjective norms, and barriers affect the implementation of additional SWM programs based on the Theory of Planned Behavior (TPB). A secondary purpose was to identify the differences in intention to implement sustainable waste management programs based on characteristics of the respondents’ age, size of facility, region of the country and if the facility had a sustainable waste management committee.

In this study, 2,184 NACUFS members whose e-mail addresses were listed in the NACUFS membership directory were selected as subjects. The data were analyzed using SPSS version 17.0. Multiple linear regression analysis, T-tests, and ANOVA were used to test the hypotheses and research questions. Statistical significance was set at  $p \leq 0.05$ .

The total number of responses was 212 resulting in a 13.5% response rate. The majority of respondents had implemented SWM programs that don't require major resources. NACUFS members had positive attitudes about implementing a SWM program and their superiors, university administrators, and students' opinions were important others to consider when implementing a SWM program. Whether a college and university foodservice has a sustainability committee was the only demographic that significantly influenced NACUFS members' intentions to implement a SWM program.

Overall, attitude and subjective norms were the only significant predictors of intention to implement a SWM program ( $p \leq .05$ ). Therefore, if NACFUS members have a positive attitude about sustainability, important others around them who agree and there is a sustainability committee within the operation, they are more likely to implement a SWM program.

**Keywords:** Sustainable waste management, TPB, college and university foodservice

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## **Dedication**

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## **CHAPTER 1: Introduction**

Today, the rapid development of modern science and technology has allowed humans to use many of these innovations to improve their quality of life. At the same time because of these improvements and population growth, humans are facing serious environmental challenges such as global warming, world population increases, overrun of solid waste materials, environmental pollution, etc. (Goodland, 1995; Hedin & Likens, 1996; Last, 1993). As a result, strategies for sustainable development are being adopted by governments, institutions, operations, and individual households (Citizens United for Renewable Energy and Sustainability [CURES], 2006). Likewise, the concept of sustainability has begun to gain momentum in various areas of the hospitality and tourism industries (Michael, 1999).

When one searches for sustainability on Google, more than thirty million links are displayed, and yet the concept of sustainability is still vague to many Americans and those who are employed in hospitality related professions. The definitions of sustainability are focused on the outcome rather than an explanation of how to achieve this outcome (Hardy, Beeton, & Pearson, 2002).

Sustainability is defined as using methods, materials, and systems that will not deplete resources and has a zero or a positive impact on the environment (Rosenbaum, 1993). It “identifies a concept and attitude in development, which looks at a site’s natural land, water, and energy resources as integral aspects of the design” (Vieira, 1993, p.1) and “integrates natural systems with human patterns and continuity, uniqueness and place-making” (Early, 1993, p. 209).

Recently, many colleges and universities have joined the sustainable development movement by participating in a nation-wide green campus competition. By doing so, more schools are taking action on sustainability measures, reflecting their increasing concern about the environment (Sustainable Endowments Institute [SEI], 2008). Among nine categories (including: administration, climate change and energy, food and recycling, green building, student involvement, transportation, endowment transparency, investment priorities and shareholder engagement), college food and recycling received the highest scores in the ratings. Most college and university foodservice directors, associate directors, managers, and others recognize their role in sustainability and have implemented programs which include (1) tray-less dining, (2) recycling programs, (3) grab-n-go packaging, (4) purchasing of seasonal, local & organic food, and (5) composting of food waste (SEI, 2008).

### **Problem Statement**

Reflecting on the sustainability trend, some research initiatives have addressed growing awareness and attitudes about environmental management (Gustin & Weaver, 1996). In addition, a number of studies have focused on identifying sustainability initiatives for hotels and restaurants and their motivations for environmental management (Kirk, 1995; Bohdanowicz, 2005; Mensah, 2006).

To date, few studies have been conducted that measure how National Association of College and University Food Services (NACUFS) members are responding to sustainable waste management and the new Sustainability Guide published by the NACUFS organization in September 2009. Kelly (2003), a

NACUFS guest director, stated that the first step in starting a green foodservice program is to understand what sustainability is and is not, because sustainability is a very broad and complex term (Aber, Kelly, & Mallory, 2009). In the present study, sustainable waste management is defined as promoting waste reuse, reducing, recycling management, waste prevention, and composting of waste to reduce negative impacts on the environment (Hale, 2007).

With increasing pressure due to the lack of resources, college and university foodservice directors, associate directors, managers, and others have come to play an important role in environmental stewardship. Yet, can they apply their knowledge to developing practical outcomes and solutions? Research is needed to determine the current attitudes and subjective norms of NACUFS members and possible barriers to implementing sustainable waste management programs (Aber, et al., 2009).

### **Hypothesis Development**

According to Ajzen's (1991) Theory of Planned Behavior (TPB) there are three predictors that determine whether or not a person intends to do something. These predictors include: (1) if the person is in favor of doing it ('attitude'); (2) how much the person feels social pressure to accomplish it ('subjective norms'); and (3) if the person feels in control of the action ('perceived behavioral control').

*Attitudes towards the behavior.* Ajzen and Fishbein (1980) have found that attitude towards the behavior is determined by a person's evaluation of that behavior, and attitude is one of the best predictors of behavioral intention. It is assumed that if

the person is in favor of doing something, then he/she may have more intention to do so. The function of attitude toward the behavior is the behavioral beliefs of these expected outcomes and the evaluations of these expected outcomes (Ajzen, 1991). For example, if NACUFS members have a positive attitude toward sustainable waste management, they will more likely implement a “sustainable waste management program” (Chen, 2008).

***Subjective norms about the behavior.*** Ajzen and Madden (1986) stated that subjective norms measure the perceived social pressure to perform or not to perform a behavior. Ajzen and Fishbein (1980) explained that the subjective norm summarizes the beliefs of other people concerning how the individual should behave in a situation (normative beliefs) and how motivated the individual is to comply with those individuals (motivation to comply). For example, NACUFS members’ intentions to implement a sustainable waste management program increases as subjective norms, such as customers, competitors, vendors and suppliers, employees, or superiors, become more favorable (Chen, 2008).

***Perceived behavior control of the behavior.*** Some internal factors of perceived behavior control include: individual differences, information, skills, abilities, and emotion; some external factors include: time, cooperation of others, and financial limitations (Ajzen, 1985). Ajzen (1991) postulated that people may have a positive attitude towards performing a behavior, but they may not intend to perform it when faced with perceived barriers. Perceived behavioral control refers to one’s personal control over their behaviors and decision making, which also influences the

judgment of risks and benefits of their performing the behavior. Thus, if a person perceives more challenges in performing, then their intention to perform is lower. Several reports have shown that college and university foodservice directors, assistant directors, managers, and others are facing specific and unique challenges to implementing sustainable waste management programs (Chen, 2008; Shanklin et al, 2003; University of Vermont, 2007).

***Behavioral intention.*** Ajzen and Fishbein (1980) stated that behavioral intention is a combination of a person's attitude toward the behavior, subjective norm, and perceived behavioral control.

### **Purposes of the Study**

The primary purposes of this study were to ascertain what SWM programs have been implemented in college and university foodservice operations, and determine how NACUFS members' attitudes, subjective norms, and barriers affect the implementation of additional SWM programs based on the Theory of Planned Behavior (TPB). A secondary purpose was to identify the differences in intention to implement additional sustainable waste management programs based on characteristics of the respondents' age, size of facility, region of the country and if the facility had a sustainable waste management committee. Several analyses were tested to examine the proposed hypotheses. Based on a review of the previously published literature, the three hypotheses for the present study were as follows:

**Hypothesis 1:** NACUFS members' attitudes toward implementing a sustainable waste management program positively affect their intentions to implement a sustainable waste management program.

**Hypothesis 2:** Subjective norms of NACUFS members positively affect their intentions to implement a sustainable waste management program.

**Hypothesis 3:** The barriers of implementing a sustainable waste management program negatively affect their intentions to implement a sustainable waste management program.

### **Research Questions**

1. What sustainable waste management programs have NACUFS members implemented in their operations?
2. What are the attitudes of NACUFS members about sustainable waste management?
3. Who and what are the subjective norms of NACUFS members relative to sustainable waste management?
4. What are the barriers to implementing a sustainable waste management program in college and university food services?
5. What are the differences in attitude, subjective norms, implementation intention, and barriers of implementing a sustainable waste management program by age of NACUFS members, number of meals served, area of the country, and the status of a foodservice facility sustainability committee?

## **Significance of the Study**

Very little research has been found that investigates NACUFS members' attitudes, subjective norms, barriers, and implementation of sustainable waste management programs. Results from this study can be used to evaluate the environmental attitude, subjective norms, challenges, and implementation gap among NACUFS members by age, number of meals served, and locations of the country. The results will assist college and university food service operations to compare themselves on sustainable waste management implementation with other similar foodservices facilities. It will also provide feedback for the NACUFS organization to determine how their members are responding to the newly released Sustainability Guide and provide new information for areas of training that directors may need to implement a sustainable waste management program.

## **Definition of Terms**

**Attitude.** A psychological tendency is expressed by “the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question” (Ajzen, 1991, p188).

**Barrier.** A limit or boundary for achieving the tasks.

**Behavior.** In the TPB, it is a marker of attitudes and beliefs and is amenable to change through observation, feedback and the removal of barriers to safe behavior (Aizen, 2006).

**Behavioral Intention.** The individual's assessment to perform or not to perform the behavior in question (Ajzen & Fishbein, 1980).

**College Sustainability Report Card.** An evaluation of colleges and universities with the 300 largest endowments in the United States and Canada (Sustainable Endowments Institute [SEI], 2008).

**Composting.** The process of converting decomposable organic waste into useful stable products (Rattie, 1992)

**Economic Sustainability.** The sustainable use of resources that can be applied to an economic level (Gilbert, Stevenson, Girardet, & Stren, 1996).

**Environmental Sustainability.** The ability of the environment to continue to function properly indefinitely. Further, it is the practice to ensure that the biodiversity, clean air, water and land, emission reductions, and carrying capital remain balanced to conserve and recycle resources, and reduce waste (Gilbert, Stevenson, Girardet, & Stren, 1996).

**Focus Group.** A small group interview, typically consisting of six to eight participants who come from similar backgrounds and moderated by a person who works from a predetermined list of questions (Morgan, 1998).

**Food Waste.** Includes leftover portions of meals and trimmings from food preparation activities in kitchens, restaurants, fast food chains, and cafeterias. Food waste is the third largest component of generated waste (Kolnitz & Kaplan, 2009).

**NACUFS.** The National Association of College & University Food Services (NACUFS), founded in 1958, is the trade association for foodservice professionals at more than 625 institutions of higher education in the United States, Canada, Mexico, and abroad. NACUFS uses volunteer committees, project teams, and

professional staff to provide members with a full-range of educational programs, publications, management services, and networking opportunities (NACUFS, 2009).

**Perceived Behavioral Control.** An individual's beliefs about control that help or hinder the implementation of that behavior (Ajzen, 1985).

**Recycling.** Collecting, sorting and processing recyclable materials into raw materials such as fibers, and then manufacturing these raw materials into new products, as well as purchasing recycled products (EPA, 2008a).

**Social Sustainability.** The practice that ensures society's cohesion and its ability to interact efficiently to reach common goals (Gilbert, Stevenson, Girardet, & Stren, 1996).

**Solid Waste Landfills.** A system of trash and garbage disposal in which the waste is buried between layers of earth to build up low-lying land. Any discarded, abandoned, or considered waste-like materials in an area built up by landfill. It can be solid, liquid, and semi-solid or containerized gaseous material. (Department of Environmental Conservation [DEC], 2009; EPA, 2008b)

**Subjective Norm.** A function of a set of beliefs concerned with the likelihood that important individuals, such as a spouse, parents, or friends, would approve or disapprove of their behavior (Ajzen & Madden, 1986).

**Sustainability.** Using methods, materials, and systems that will not deplete resources and has zero or a positive impact on the environment (Rosenbaum, 1993).

**Sustainable Development.** It is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987).

**Theory of Planned Behavior (TPB).** A theory that explains behavior as an antecedent of three variables: attitude, subjective norm, and perceived behavioral control (Ajzen & Fishbein, 1980).

**Waste Reduction.** Using source reduction, recycling, or composting to prevent or reduce waste generation (EPA, 2008c).

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## CHAPTER 2: Review of Literature

This chapter summarizes literature related to the objectives of the study. The topics include: (1) Sustainability Theory Background Review (concept of sustainable model, revolution of sustainability, and the definition of sustainability), (2) Sustainable Waste Management Practical Background Review (types of environmental issues, ways to approach sustainability, sustainable waste management in the hospitality industry and college/university dining services), and (3) A Review of Methodology Background (the Theory of Reasoned Action and Theory of Planned Behavior).

### **The Concept of Sustainability**

The Concept of Sustainable Models and the definition of sustainable development defined in the Brundtland Report in 1987 were vague, yet it pointed out two fundamental issues: the problem of the environmental degradation that accompanies economic growth and the need for this growth to mitigate poverty. In the business world, the core of mainstream sustainable development (SD) is a balance among three dimensions: (1) Economic Growth, (2) Environmental Protection, and (3) Social Development, also known as the “three pillars” (Hart, 1997).

Understanding the concepts of social, environmental, and ecological sustainability could be the first step toward clarifying questions about sustainability which include: Why do we need to be concerned about sustainability issues; what is to be sustained; for whom; how long; and what are the challenges and limitations?

***Social sustainability.*** This practice ensures that there is societal cohesion that interacts efficiently to reach common goals. Humans tend to neglect the importance and

challenges of social development in sustainability. To better protect our environment, individuals need to place more emphasis on: urban planning, transportation, education and outreach, a standard of living to be equitably distributed among social classes and gender, diversity, ethical consumerism, and human rights. The overlapping area between the environment and social circles is called *socio-environmental* and addresses concerns about: health and safety, regulations and complaints, and climate change (Gilbert, Stevenson, Girardet, & Stren, 1996).

***Environmental sustainability.*** This is the practice that ensures biodiversity, clean air, water and land, emission reductions, and carrying capital remains are balanced to conserve and recycle resources, and reduce waste. The overlapping area between the environment and economic circles is called *eco-efficiency* which addresses concerns about energy efficiency, resource conservation, and lifecycle management. The purpose of eco-efficiency is to find ways of reducing the amount of resources needed for increasing population growth and consumption (Gilbert, Stevenson, Girardet, & Stren, 1996).

***Economic sustainability.*** Financial feasibility occurs when development moves towards social and environmental sustainability. Historically, there has been a close correlation between environmental degradation and economic growth. The aim is to generate income and employment to sustain the population, economic growth, risk management, innovation and to maximize profits, expand markets, and externalize costs. The overlapping area between social and economic circles is called *socio-economic* and addresses concerns about job creation, social investment, and security (Gilbert, Stevenson, Girardet, & Stren, 1996).

***Sustainable development (SD) models.*** The concepts of sustainability and sustainable development (SD) provide ways to address and decrease potential environmental degradation, social ailments, and economic disparities. These concepts, however, are still unknown, unfamiliar, or misunderstood by the majority of world citizens, and, more importantly, to educated foodservice professional administrators (Hardy et al., 2002). In order to better understanding these terms, it is necessary to have a greater awareness about sustainability models.

From the research literature there are three sustainability models: (1) the *Concentric Circles Model*, (2) the *Non-Concentric Circles Model*, and the most commonly used one, (3) the *Interlocking Circles Model*. All three graphic representations provide different ways of conceptualizing sustainability and the relationships between the social, environmental and economic circles (Dalal-Clayton & Bass, 2002; Hart, 1997; Mebratu, 1998; Mitchell, 2000; Peattie, 1995).

***Interlocking circles model.*** This model shows how the union is created by the overlapping circles among the social, environmental, and economic pillars of sustainability. This model was adapted in 2005 from the International Union for Conservation of Nature (IUCN) Programme and presents a basic approach to understanding sustainability for people who are not familiar with the interaction of the three pillars and the terms (Dalal-Clayton & Bass, 2002; Hart, 1997; Mebratu, 1998; Mitchell, 2000; Peattie, 1995).

Theoretically, this model considers social, environmental, and economic pillars to be overlapping circles of the same size; the area of overlap is sustainability. These three components are not mutually exclusive, rather they are mutually reinforcing. As the

environment, society, and the economy become more correlated, the area of overlap increases, and so does sustainability (Adams, 2006).

A prosperous society relies on a healthy environment to provide abundant resources, safe food and water, and clean air for its citizens. Humans seek more resources for social development and economic growth, they lower concerns about the importance of environmental protection, thus, to maintain or improve the quality of life and standard of living in the long-run, training and education on risk management, capacity efficiency, and innovations of sustainability are needed to better balance the model (Kitzhaber, 2000).

## **Evolution of the Concept of Sustainability**

***Early civilizations.*** The Neolithic Revolution was the first agricultural revolution – the transition from the hunter-gatherer way of life to a more settled farming style. In early human history the demands for energy and resources were small, until the Neolithic Era, when an agriculture economy emerged in various regions of the world (Diamond, 1998). The food security created by this economy allowed humans to settle one place instead of migrating for wild animals and grazing land. Intensified agriculture ensured a much greater population density. It led, however, to deforestation which increased flooding. Through agriculture, therefore, humans first faced challenges between the environment and development (Meadows, 2006).

***Industrial societies.*** The first Industrial Revolution began in England in the 18th century. Technological and scientific growth over several millennia gave humans more power to control the environment (Hilgenkamp, 2005). The use of coal raised practical problems of earth moving, mine construction, transportation, controlled

combustion, and water pumping, which resulted in humans working around mines and mills. In the Romance Movement of the 18th century, some enlightened political economists addressed their concerns about the environment and social impacts on industrial societies, because the standard of living for most of the industrial workforce was below that of a farmer (Meadows, 2006).

Again the Industrial Revolution, just like the previous Neolithic Revolution, created its own scarcity of total carrying capacity of the global environment. The Industrial Revolution successfully raised public awareness about the global environmental issues of that time.

*Environmentalism and sustainable development in the 20th century.* By the 20th century, the Industrial Revolution had led to an exponential increase in human consumption of resources. Journalists, scientists, politicians, managers, and citizens in many parts of the world were concerned about the problem of global environmental issues and that humans might be a cause. The sustainability movement, therefore, originated from a series of meetings and reports dating back more than 30 to 40 years ago (Harding, 2006).

The Council for Environmental Education (CEE) was founded in the United Kingdom in 1968. Environmental education and education for sustainability were defined as providing skills, training, knowledge, awareness, concern, and education for people to participate in managing the environment (Hawthorne & Alabaster, 1999). The conference marked the first occasion where conservationists and educators came together. Development, promotion, and review were the three broad goals for this significant meeting (Palmer, 1998).

Other important meetings followed. In 1972, sustainability was a key theme of an international meeting, often known as the United Nations Stockholm Conference on the Human Environment. The concept of the conference suggested that it was possible to achieve economic growth and industrialization without environmental damage (Mebratu, 1998). In 1980, the World Conservation Strategy (WCS), prepared by the United Nations Environmental Program (UNEP) together with the World Wildlife Fund (WWF) identified the priority conservation issues and ways for effectively achieving the WCS's aim. It explained that the human race had to care about the environment for its own benefit (McDonald, 1996).

In 1987, the World Commission on Environment and Development published "Our Common Future", often known as the Brundtland Report. This report focused on concerns about the environment and poverty in many parts of the world. It first defined sustainability as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987).

In 1992, sustainability became a strong concept at the United Nations Conference on Environment and Development, also known as Agenda 21. This Earth Summit took place in Rio de Janeiro, Brazil and 172 governments were represented and two statements of principles, two international agreements, and a strong action agenda on sustainable development were published from this meeting (UNCED, 1997).

***Global environmental awareness & leadership in the 21st century.*** In the 21st Century, more specific research and detailed studies led to an understanding and awareness of the importance of sustainability. Almost every national government in the United Nations has a minister and a department responsible for environmental policies.

More and more formulas, equations, and models have been created to solve environmental problems. Along with the increasing rate of environmental challenges and large quantities of energy demands, a new term for the movement “Going Green” was proposed (Dale & Stuart, 2001, and Pyle, 2008).

## **Sustainability Defined**

Because the term *sustainability* is very broad and complex, the primary focus in this study is on the concept of *environmental sustainability* (Aber & Mallory, 2009; Robert, 2005). By definition, sustainable means using methods, materials, and systems that will not deplete resources and has a zero or a positive impact on the environment (Rosenbaum, 1993). Sustainability “identifies a concept and attitude in development, which looks at a site’s natural land, water, and energy resources as integral aspects of the design” (Vieira, 1993, p. 1). It “integrates natural systems with human patterns and continuity, uniqueness and place-making” (Early, 1993, p. 209).

## **Sustainability Practical Waste Management**

*Applications for sustainable development.* With problems such as global warming, world population increases, environmental pollution, ecological depletion of the ozone layer, soil degradation, deforestation, loss of biodiversity, acid rain, hunger, and increasing natural resource depletion, humans have begun to be concerned about the environment. Many strategies for sustainable development have been adopted by governments, institutions, operations, and individual households (Citizens United for Renewable Energy and Sustainability [CNRES], 2006).

## **Sustainable Energy Development.**

**Supply.** Fossil fuels, including oil (38%), coal (24%), and natural gas (24%) represent 86% of the total world energy supply while nuclear energy (6.3%) and renewable energy (13.6%) represent a smaller percentage (Çengel, 2007). Presently known reserves of oil will last around 41 years, coal 155 years, and natural gas 64 years. Thus, using fossil fuels for energy supply will not be sustainable (Goldemberg, 2007).

**Demand.** By 2030, global energy consumption is expected to be 55% higher than in 2008 (a 2% per year increase) and is because of population growth, continued urbanization, and economic expansion. The increasing demands are mainly from developing and industrialized countries, especially China, India, and Brazil (EIA, 2009). Global fossil burning was predicted to grow by 78% in 2015 and it will double the fossil expenditure growth rate compared to ten years ago according to the International Energy Outlook (Gruenspecht, 2009).

**Perspective of sustainable energy development.** A sustainable energy future depends on an increased share of renewable energy because fossil fuels are limited energy resources and they emit pollutants (e.g., acid rain & smog) during combustion (Çengel, 2007). On a global scale, renewable energy (e.g., solar, wind, bio-energy, geothermal, modern biomass, hydroelectric, and marine tidal) is considered one of the most efficient ways to achieve sustainable development and represents less than 14% of primary energy consumption. Many developed countries, including Denmark, Germany, Spain, and the United States, have adopted sustainable energy strategies and new technologies to decrease pollution and ensure greater security of the energy supply (Johansson, & Goldemberg, 2005; World Bank, 2006). Among developing countries,

Brazil's long-running, successful sugarcane ethanol program is an example of growth in the use of green energy (Martinot, et al., 2002).

## **Water Conservation and Management**

***Why water efficiency?*** According to Population Reports (1998), the world's population is growing dramatically by about 80 million people each year. This growth is putting stress on available water supplies and distribution systems. In the United States, from 1995 to 2000, the population nearly doubled, yet the public demand for water supplies tripled. A recent government survey showed that by 2013, over 70% of states in the United States will experience water shortages, and by 2025, four billion world citizens will live in serious water shortage stress conditions (EPA, 2009).

Because of the increasing competition over water usage, a country's level of freshwater use per house hold reflects its level of economic development. In Africa, annual per capita water withdrawals for personal use average only 17 cubic meters; Asia averages 31 cubic meters; the United Kingdom averages 122 cubic meters; and the United States averages 211 cubic meters (Block, 2009; EPA, 2009). Water shortage and problems with pollution have become a limiting factor for sustainable economic growth in many parts of the world. Ismail Serageldin, Vice-President of the World Bank, made a prediction in 1995: "If the wars of this century were fought over oil, the wars of the next century will be fought over water" (Shiva, 2002, p.107).

***Water management and benefits.*** To help preserve water supplies for future generations, save money, and protect human health & the environment, humans must

conserve water by installing water efficient devices, eliminating unnecessary water waste, improving water conservation awareness, and using water efficient products (EPA, 2009).

### **The Three R's: Recycle-Reduce-Reuse**

*Possible ways to recycle-reduce-reuse.* Generally, wastes are divided into two categories: biological nutrients and technical nutrients. Biological nutrients are those that at the end of their useful life can safely and readily decompose and return to the organic cycle. Technical nutrients are made of highly stable materials designed to be used again and again (McDonough & Braungart, 1998). Reducing can be done by limiting product packaging, riding bikes instead of driving cars, starting a compost bin for food waste, and using e-billing instead of mailings. Ways to reuse include purchasing reusable organic bags and coffee mugs, storing food in reusable plastic containers, and using silverware and dishes instead of plastic utensils and plates. Recycling can be accomplished by purchasing products that contain recycled materials and throwing recyclable waste into recycling bins (EPA, 2008a).

*Why Recycle-Reduce-Reuse?* Each year, Americans throw away about 50 billion food and drink cans, 27 billion glass bottles and jars, and 65 million plastic and metal jars, and can covers. More than 30% of these wastes are packaging materials (Brodie, 1998; EPA, 2008b).

*Benefits of recycle-reduce-reuse.* Business operators have a difficult time isolating recyclable waste from regular trash because of their working hours, diversity of functions and immediacy of quality service (EPA, 2008c). Adopting waste reduction programs in organizations conserves valuable resources and may cut down on operational costs, solid waste pollution, and energy & landfill space (Winter & Azimi, 1996).

## **Buildings and Implementing Environmental Operations**

**“Green” building trend.** Buildings account for 72% of electricity consumption, 39% of energy use, 38% of all carbon dioxide (CO<sub>2</sub>) emissions, 40% of raw materials use, 30% of waste output, and 14% of potable water consumption in the United States (EPA, 2008c). Because buildings have a profound impact on the environment, economic, health, and productivity, there are an increasing number of companies in North America, especially large producers and hotels, that have a green program and many are obtaining LEED certification (U.S. Green Building Council [USGBC], 2008).

**What is LEED?** An ecology-oriented building certification program, the Leadership in Energy and Environmental Design (LEED) operates under the auspices of the U.S. Green Building Council (USGBC, 2008). LEED certification is recognized worldwide as a standard measuring tool for building sustainability. The LEED green building rating system is designed to promote design and construction practices that can increase profitability, improve health conditions, and reduce the negative impacts on health and environment. LEED concentrates its efforts on improving an operation’s performance in five key areas: (1) sustainable site development, (2) water savings, (3) energy efficiency, (4) materials selection, and (5) indoor environmental quality.

**Advantages of green buildings.** Environmental benefits include enhancing and protecting ecosystems and biodiversity, improving air and water quality, reducing solid waste, and conserving natural resources. Economic benefits are reducing operating costs (30% savings on energy, 35% on carbon, 30%-50% on water, and 50%-90% on waste), enhancing asset value and profits, improving employee productivity and satisfaction, and optimizing life-cycle economic performance. Health and community benefits have been

found that improve air, thermal, and acoustic environments, enhance occupant comfort and health, minimize strain on the local infrastructure, and contribute to the overall quality of life (EPA, 2008; USGBC, 2009).

## **Carbon Footprint**

***What is a carbon footprint (CF)?*** Hammond (2007) stated that footprints are spatial indicators which can be measured in hectares or square meters. The Carbon Trust (2007) found that the carbon footprint is often referred to as ‘carbon weight’ which has units of kilograms or tons of carbon dioxide equivalents. Wiedmann & Minx (2007) defined carbon footprint as a measure of the net emissions of carbon dioxide and other green house gases that is directly caused by one person’s activities through burning fossil fuels for electricity, heating, and transportation, etc or is indirectly accumulated over the lifecycle of products, processes, and services people use.

***Why calculate the carbon footprint?*** The European Commission (2007) stated that a carbon footprint is a life cycle assessment that has a positive effect on climate change. An example of this would be using less carbon emissions by utilizing green energy. The carbon footprint is a powerful tool to explain the impact of personal behavior on global warming. Along with climate change, the term ‘carbon footprint’ has been widely used in the media and carbon footprint calculations are in demand (Wiedmann & Minx, 2008). Reducing the carbon footprint can be achieved at personal or professional levels by recycling, reducing, and reusing solid wastes, increasing energy efficiency, purchasing locally, and minimizing packaging (Jefferson, 2009).

## **Waste Management in the Hospitality Industry**

The concepts of sustainability and sustainable development (SD) in sustainable waste management programs have begun to gain momentum in various functions and activities in the hospitality and tourism industries. Hotels and motels have implemented environmentally conscious practices or converted to the “green movement” for many reasons (Wolfe & Shanklin, 2001). There are approximately 4.5 million rooms at 48,000 hotel and motel properties in the United States (American Hotel & Lodging Association [AH&LA], 2008). Although each of these properties has its own unique operating characteristics, they benefit from implementing innovative sustainable waste management strategies that: (1) protect the environment, (2) provide better ways to meet customers’ needs in “green” operations, (3) cut down waste and costs, (4) increase environmentally-related governmental policies and regulations, (5) gain more competition power for “green” markets, (6) boost employee morale, (7) limit risks, and (8) build a strong reputation and improve public relations (Morgan, 2007). The “green” hotel was produced with the support of world leaders in the hospitality industry, including Accor, Carlson Hotels Worldwide, Hyatt, Hilton, Intercontinental Hotel Group, Marriott, Rizzardi, and Starwood (Enz & Sigward, 1999).

## **Waste Management Initiatives in Hotels, Motels and Resorts**

*Recycling programs.* Marriott preserves the environment with the ECHO (Environmentally Conscious Hospitality Operations) program through eco-friendly guidelines to all hotels and associates through the “reduce-reuse-recycle” process”. Hyatt Regency Scottsdale has formed an active Green Team to implement the container recycling system, which diverts plastic, metal, and glass containers from the resort’s

compactor. Color-coded bins have been distributed in all back of house areas to make it easier for employees to recycle reusable wastes. Hyatt Regency Chicago implemented a comprehensive recycling program that helped the hotel cut the waste costs in half and remove 25 % of hotel garbage from landfills (Bâli & Balfe, 1998, and Enz & Siguaw, 1999).

***Resources conservation.*** Kimpton Corp. uses an in-room recycling program, has introduced organic foods and beverages into hotel mini bars, and their EarthCare program sets standards across all Kimpton properties. More than 40 environmentally friendly practices encourage the preservation of energy, water, air and land (Mata & Ilana, 2007). Hilton announced its long term goals and objectives towards building sustainability by reducing energy consumption from direct operations by 20%, CO2 emissions by 20%, output of waste by 20%, and water consumption by 10% (Bain & Walker, 2008). Starwood has signed an exclusive three-year agreement with Philips Electronics to provide SmartPower energy efficient televisions to its 460 properties across North America (Wolf & Kavanagh, 2009). Accor has confirmed its sustainable environment commitment by offering special sustainability training for employees, encouraging customers to reuse, reduce and recycle, and donating 50% of the savings on laundry costs when guests keep their bath towels for more than one night (Baumgartner & Delrieu, 2008).

***Food waste composting.*** Fairmont Hotels & Resorts composts excess food and leftovers, provides complimentary parking for hybrid vehicles, and converts kitchen grease to bio-dynamic fuel (Fairmont, 2009). Many years ago, the Holiday Inn North in St. Paul, Minnesota asked employees to divert food waste from their small compactor in

the kitchen. This simple action helped the hotel to recover approximately 75% of the total food waste produced. As a result, the recycling program cut waste costs around \$500 each month (Bâli & Balfe, 1998).

## **Waste management initiatives in restaurants**

*Quick service restaurants.* McDonald's with nearly 14,000 restaurants nationwide, adopted EarthShell containers made from reclaimed potato starch, natural limestone and post-consumer recycled fiber to reduce risk to wildlife (Construction Art, 2008). Starbucks has used organic coffee grounds, smaller size paper napkins and garbage bags, and discounts to guests if they purchase a reusable tumbler. It has set its 2009 eco-friendly goals for all new company-owned stores to have 50% of energy come from renewable sources, which will be 25% more energy efficient (Schultz, 2007). Pizza Fusion is the only restaurant chain in the world to build all their restaurants to LEED certification standards. Their restaurants feature a number of unique, eco-efficient products, techniques and designs, such as, insulation made from recycled blue jeans, 30% recaptured industrial concrete, ceiling baffles made from recycled composite board, and countertops from reused glass bottles (Haley, 2007). KFC - Taco Bell leads in sustainability by using solar energy preheating of fresh air coming into the building, daylight harvesting and LED lights, green power purchasing through RECs (Renewable Energy Certifications) firms, rainwater collection for irrigation, low-flow plumbing fixtures and composting and waste recycling, including enhanced cooking oil reclamation (Chain Leader, 2009).

Other restaurant chains that have joined in the sustainability movement include Denny's Corp., Chipotle Mexican Grill Inc., and Subway. With about 250,000 fast-food

restaurants in the U.S., this industry could make a large contribution to energy-saving and environmental protection efforts (Construction Art, 2008).

### **Waste Management in College & University Dining Services**

Recently, many colleges and universities have joined the green campus competition. Each year, the College Sustainability Report Card evaluates colleges and universities with the 300 largest endowments in the United States and Canada. Between 2008 and 2009, 66 percent of the evaluated colleges and universities improved their overall grade from an average “C” to a “C+” average (Sustainable Endowments Institute [SEI], 2008).

More schools are taking action on sustainability measures, in part, because of increasing concern about environmental issues (SEI, 2008). Among nine categories (including: administration, climate change and energy, food and recycling, green building, student involvement, transportation, endowment transparency, investment priorities and shareholder engagement), college food and recycling received the highest scores in ratings. Most college dining facility directors recognize their role in sustainability by conserving water and energy through waste management in the following ways: (1) recycling programs, (2) grab-n-go packaging, and (3) food waste composting.

***Waste management.*** Traditionally, most garbage is buried in landfills, yet landfills are filling up and closing down all over the country. Incineration is a poor alternative. Kolnitz and Kaplan (2009) stated that even with pollution controls, incinerators are the largest new source of air pollution, acid gases, toxic ash, carbon monoxide, and dioxins. Thus, when deciding how to handle solid waste, the alternatives

should be in this order: source reduction, recycling, reusing, incineration and then land filling.

***Recycling programs.*** Colleges and universities have a unique opportunity to manage waste by using resources efficiently and effectively, collecting materials for recycling and reusing, and composting food wastes (Wie and Shanklin, 2001). Those actions can help them to enhance their reputation while reducing costs and contributing to a better community.

Kansas State University (KSU) is committed to becoming a more environmentally aware community by expanding recycling efforts across the campus. Their goal is to enhance the campus environment, minimize the waste stream, decrease waste management costs and help the planet. Housing and Dining Services has a pilot program for recycling at the residence halls. Moreover, housing and dining services uses "green" cleaning chemicals for housekeeping activities and all carpet is 100% recyclable as are many other products (KSU, 2010).

***Grab-n-go packaging.*** To reduce packaging waste, university dining services preferred food products can be purchased in bulk or in concentrate form, and many come in containers that are reusable, refillable, and recyclable or made with recycled content (Saphire & Goldstein, 1998). Services at the Massachusetts Institute of Technology, the University of Vermont, the University of Oregon, Dickenson College, and Colorado State University started to reduce waste by encouraging students to use fewer napkins and take only what they could eat. The students have the option of using disposable containers or checking out a reusable container with their university ID. More recently, Dickenson College started selling homemade reusable to-go bags for the students to use at the Grab-

n-Go to avoid wasting plastic disposable bags. The Massachusetts Institute of Technology started selling snack foods in bulk to offset the waste generated by individually pre-packaged snacks, using fountains for their sodas, juices and milk as opposed to individually pre-packaged drinks. The reusable bags, disposable containers, and packaging reduction are incentives for students to reduce waste and are good ways to educate incoming freshmen on sustainable practices (Brown & Eaton, 2007).

***Food waste composting.*** University of Vermont (2008) listed items can be composted as follows: fruit and vegetable peels, any food leftovers, coffee grinds /tea bags, meat scraps & bones, dairy & cheese products, noodles & pasta, and paper napkins. Items cannot be composted as follows: paper cups, plates or bowls, dishes or silverware, coffee creamers or stirrers, Styrofoam cups, plastic bags or saran wrap, and food wrappers or paper.

***Food composting at dining centers.*** Composting is a process that takes organic waste including food scraps and yard waste, and turns it into a nutrient-rich soil. The University of Vermont Dining Services has begun to collect food waste from several locations and take them to the Interval Compost Facility for composting (University of Vermont, 2008).

***How is food waste collected?*** The following steps are involved in the process of collecting food waste: (1) A contracted hauler uses a special dump truck to collect food waste, (2) the truck is equipped with a hydraulic operated bucket that can dump two or more carts at once, (3) the carts are lined with a special biodegradable liner made of cornstarch which helps keep the insides of the carts moderately clean, and (4) the carts are kept inside or outside the dining services loading dock, depending on the availability

of space. The challenges involved include: maintaining cleanliness of the carts and keeping them from freezing solid in the winter (University of Vermont, 2008).

## **Sustainability Methodology Research Review**

***Problem statement.*** The definition of sustainability found in “Our Common Future, Report of the World Commission on Environment and Development” was vague and only focused on the outcome but failed to explain how to achieve this outcome (WCED, 1987). Kelly (2003), a NACUFS guest director, stated that the first step in starting a green dining services program is to understand what sustainability is and is not because sustainability is a very broad and complex term (Aber & Mallory, 2009; Robert, 2005).

The National Association of College & University Food Services (NACUFS), founded in 1958, is the trade association for foodservice professionals at more than 625 institutions of higher education in the United States, Canada, Mexico, and abroad. It uses volunteer committees, project teams, and professional staff to provide members with a full-range of educational programs, publications, management services, and networking opportunities (The National Association of College & University Food Services [NACUFS], 2009).

In September, 2009, NACUFS released the Sustainability Guide to its institutional members, primarily to college and university foodservice directors. The topics covered in the guide include: (1) the critical areas of sustainability that pertain to college and university foodservice; (2) decision-making questions operators should consider before taking action in sustainability; (3) important sustainability best practices; (4) insights on the effective implementation of sustainable best practices, and (5) key measures for

assessing the effectiveness of sustainability initiatives. Also included in the document are case studies on successful sustainability measures (Boss, 2009).

With increasing concern about resources, college and university foodservice directors, associate directors, managers, and others play an important role in environmental stewardship, yet can they apply their knowledge to developing practical outcomes and solutions? To date, no published studies have been found to measure how NACUFS members are responding to the Sustainability Guide. Research is needed to determine NACUFS members' current attitudes, subjective norms, and barriers to implementing a sustainable waste management program (Aber & Mallory, 2009).

***Theoretical background.*** Ajzen and Fishbein (1980) formulated the theory of reasoned action (TRA) that assisted in explaining human behavior. The TRA explained that a behavior intention is based on the attitude toward the behavior and subjective norms. According to the TRA, if people evaluated the suggested behavior as positive (attitude), and if their surroundings wanted them to perform the behavior (subjective norm), this results in higher intention (motivation) and they are more likely to do so. This TRA was related to voluntary behavior. When behavior was not 100% voluntary, perceived behavior control was added to the model and was called the theory of planned behavior (TPB). TPB can be identified barriers that prevent individuals from performing behaviors (Ajzen, 1991). Both the TRA and the TPB showed that behavior is considered to be mediated through cognitions; that is, what we know and think affects how we act (U.S. Department of Health and Human Services [DHHS] & National Institution of Health [NIH], 2003). The conceptual model is shown in Figure 2.1.

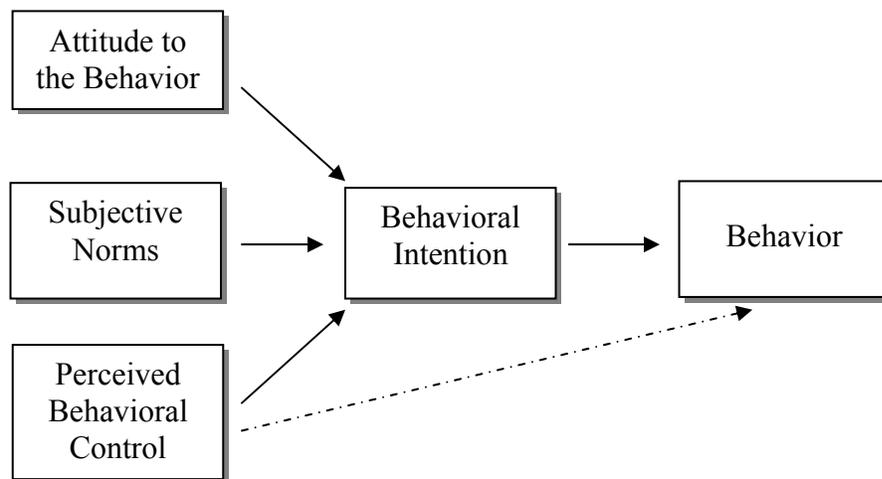


Figure 2.1. Conceptual model of the theory of planned behavior (Ajzen, 1991).

**Hypothesis development.** Cotter (2007) conducted an on-line survey to examine the role of psychological and attitudinal factors in relation to sustainable behaviors. Significant relationships were found between pro-environment behaviors and several factors (sense of responsibility, perceived control and knowledge about sustainability).

Therefore, it is believed that when college and university foodservice directors, associate directors, managers, and others have a positive attitude toward sustainable development, they will more likely intend to implement a sustainable waste management program. Also, if college and university foodservice directors, associate directors, managers, and others feel social pressure from others around them about sustainable development, they will more likely to implement a sustainable waste management program (Chen, 2008). Therefore, the following hypotheses were offered:

**Hypothesis 1:** NACUFS members' attitudes toward implementing a sustainable waste management program positively affect their intentions to implement a sustainable waste management program.

**Hypothesis 2:** Subjective norms of NACUFS members positively affect their intentions to implement a sustainable waste management program.

Ajzen and Fishbein (1980) indicate that attitudes equals to the strength of each behavioral belief ( $bb_i$ ) multiplied by outcome evaluation ( $be_i$ ), and attitude is a summation of the cross products. The following formula showed the calculation of attitude:

$$\text{Attitude toward the behavior (AB)} = \sum bb_i be_i$$

Ajzen and Fishbein (1980) also explained that in order to obtain an estimate of the subjective norms, each important individual's normative beliefs ( $nb_i$ ) multiplied by his/her motivation to comply ( $mc_i$ ), and subjective norms is a summation of the cross products. Therefore, subjective norms can be calculated as:

$$\text{Subjective norms (SN)} = \sum nb_i mc_i$$

Ajzen (1991) postulated that people may have positive attitudes towards performing a behavior, but they might not intend to perform it when faced with perceived barriers. Perceived behavioral control refers to people's personal control over their behaviors and decision making, which also influences their judgment of risks and benefits of performing the behavior. Thus, if a person perceives more challenges in performance, then their intentions to perform are lower. Several reports have found that NACUFS members are facing various challenges about implementing a sustainable waste management program such as a lack of funding, a lack of training, the inability to purchase local products, a lack of support, a lack of interest of employees to change, and a lack of staff, tools and time (Shanklin et al, 2003; University of Vermont, 2007). It is hypothesized, therefore, that if NACUFS members perceive more behavior control over

sustainable development, then the intention to implement a sustainable waste management program is higher. By contrast, if NACUFS members perceive more challenges in performing, then their intentions to perform are lower. Several reports have shown that NACUFS members are facing specific challenges to implementing a “solid waste management” program (Shanklin et al, 2003; University of Vermont, 2007). Thus, a third hypothesis was included in the present study:

***Hypothesis 3:*** The barriers of implementing a sustainable waste management program negatively affect NACUFS members’ intentions to implement a sustainable waste management program.

Ajzen and Fishbein (1980) stated to estimate the perceived behavioral control, each control belief ( $cb_i$ ) multiplied by the perceived power of the control factor ( $pp_i$ ), the control beliefs is a summation of the cross products. Therefore, control beliefs can be calculated as:

$$\text{Perceived behavioral control (PBC)} = \sum cb_i pp_i$$

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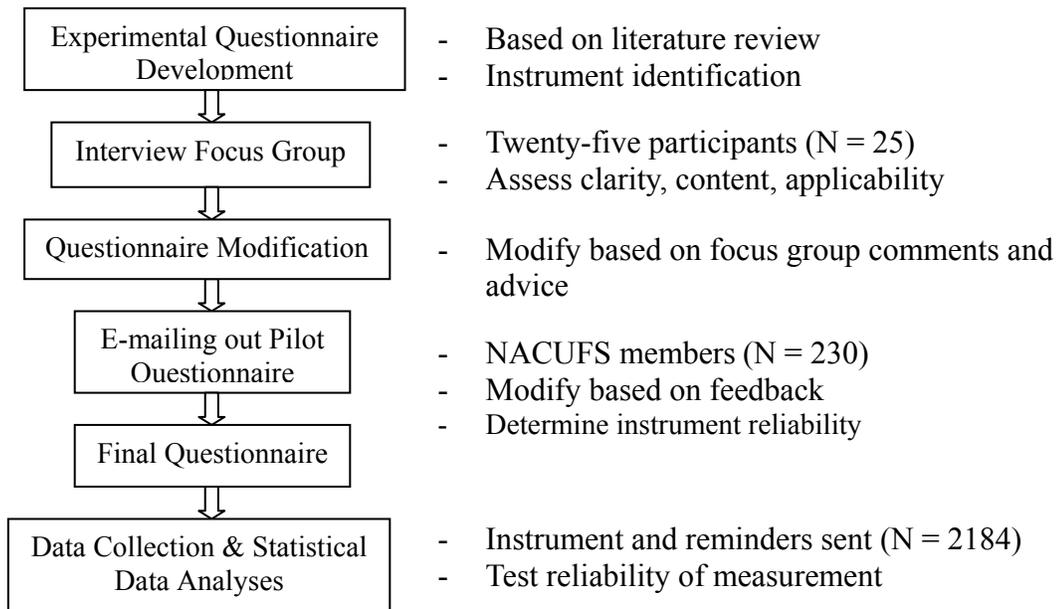
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## **CHAPTER 3: Methodology**

Little research has been conducted that investigates how NACUFS members respond to the National Association of College and University Foodservice (NACUFS) Sustainability Guide or their attitudes, subjective norms, barriers, about implementing sustainable waste management programs. The primary purposes of this study were to ascertain what SWM programs have been implemented in college and university foodservice operations and determine how NACUFS members' attitudes, subjective norms, and barriers affect the implementation of additional SWM programs using the Theory of Planned Behavior (TPB). A secondary purpose was to identify the differences in intention to implement additional sustainable waste management programs based on characteristics of the respondents' age, size of facility, region of the country and if the facility had a sustainable waste management committee.

This chapter describes the steps taken to accomplish the objectives of this study. Included in this chapter is the methodology describing the: (1) population and sample, (2) focus group study, (3) research questionnaire development, (4) pilot testing procedures, (5) final instrument design and (6) data collection and analysis. The research procedures are presented in Figure 3.1.

Figure 3.1. Procedures used in conducting the present study



### Population and Sample

The population (N = 2,184 excluding pilot study participants) from which a sample was drawn for this study were members of NACUFS, who have e-mail addresses listed in the NACUFS 2009 Membership Directory. Members in the directory can be sorted by membership regions: Continental ( $n = 206$ ), Northeast ( $n = 448$ ), Mid-Atlantic ( $n = 235$ ), Midwest ( $n = 523$ ), Pacific ( $n = 370$ ), and Southern ( $n = 402$ ). A response rate of 15% ( $n = 328$ ) was proposed to conduct the statistical analyses.

### Research Compliance

The research protocol was reviewed and approved by Kansas State University Institutional Review Board for Research on Human Subjects and documented by the approval letter (Appendix A).

## Focus Group Interviews

Foodservice managers ( $n = 25$ ) working at Kansas State University were asked to participate in focus groups. These included those employed at self-operated foodservices facilities ( $n = 20$ ) and by a contract company ( $n = 5$ ). Participants responded to five open-ended questions related to the Theory of Planned Behavior (TPB). These included attitudes, subjective norms and barriers about implementing a sustainable waste management program (Appendix B). The pilot instrument was developed from their responses and through a review of literature. The focus groups' results were similar to those found in another study (Chen, 2008), but also provided additional ideas for survey development (See Table 3.1).

**Table 3.1 Theory of Planned Behavior Focus-group Study Questions and Responses**

### *Questions:*

#### **Behavioral Beliefs (“attitudes”)**

1. Can you please describe some good things / outcomes from implementing recycling, reusing, and reducing programs at your dining facility?
2. What are some bad things / outcomes from implementing sustainable waste management practices at your dining facility?

#### **Normative Beliefs (“subjective norms”)**

3. List all the people you think care (either approve or disapprove) about whether or not you implement sustainable waste management practices at your dining facility.

#### **Control Beliefs (“barriers”)**

4. What makes (or would make) it easier for you (or other managers) to implement waste management practices at your dining facility?
5. What makes it difficult for you (or other managers) to implement waste management practices at your dining facility?

### *Responses:*

#### **Attitudes Data: (N = 25)**

- Customer satisfaction (Frequency: 16)
- Financial benefits (Frequency: 22)
- Better for the environment & less waste to landfills (Frequency: 11)
- Less food waste (Frequency: 25)

<ul style="list-style-type: none"> <li>• Good for community (Frequency: 17)</li> <li>• Employee support (Frequency: 10)</li> <li>• Higher public reputation (Frequency: 20)</li> <li>• Initiative in green movement (Frequency: 10)</li> <li>• Gain competition power in business (Frequency: 14)</li> </ul>
<p><b>Subjective Norms Data (N = 25)</b></p> <ul style="list-style-type: none"> <li>• Superior(s) (Frequency: 14)</li> <li>• Full-time / part-time employee (Frequency: 20)</li> <li>• Customers (Frequency: 25)</li> <li>• Vendor(s) / supplier(s) (Frequency: 16)</li> <li>• College sustainability administrators / president (Frequency: 21)</li> <li>• NACUFS members (Frequency: 1)</li> <li>• Other university competitions (Frequency: 15)</li> <li>• Local community / society (Frequency: 17)</li> </ul>
<p><b>Barriers Data (n=25)</b></p> <ul style="list-style-type: none"> <li>• Lack of information sharing on how to employ a sustainable waste management program (Frequency: 15)</li> <li>• Lack of support from upper level dining center management (Frequency: 6)</li> <li>• Lack of financial recourse (Frequency: 25)</li> <li>• Inability to purchase local products (Frequency: 5)</li> <li>• Lack of ability to create lasting changes (Frequency: 25)</li> <li>• Lack of interest willingness of employees to change (Frequency: 13)</li> <li>• Employee scheduling availability for training (Frequency: 24)</li> <li>• Lack of systems for attracting numbers on waste management program (Frequency: 22)</li> <li>• Lack of tools and resources (Frequency: 17)</li> <li>• Too many other competing priorities (Frequency: 7)</li> <li>• Lack of training / education (Frequency: 22)</li> <li>• Weather condition (Frequency: 14)</li> <li>• Too much stress to handle green technology (Frequency: 10)</li> <li>• Managers' time (Frequency: 14)</li> </ul>

## Questionnaire Development

Based on the previous literature review, newly released NACUFS sustainability guide, and the results of the focus group study, the questionnaire instrument included six sections: (1) foodservice operations' current sustainable waste management practices; (2) NACUFS members' attitudes about implementing a sustainable waste management program; (3) NACUFS members' subjective norms toward implementing a sustainable

waste management program; (4) barriers toward implementing a sustainable waste management program; (5) NACUFS members' intentions to implementing a sustainable waste management program; and (6) demographic and operational characteristics of NACUFS members and facilities.

## **Measurements**

**Attitudes.** Eight items measured NACUFS members' attitude toward the behavior (AB) about implementing a SWM program (customer satisfaction, reducing food waste, better for the environment, decreasing costs, good for the community, increasing employee support, giving us a better reputation on campus, giving us an advantage over our competition). NACUFS members' attitudes were measured in two parts - behavioral beliefs (BB) and outcome evaluation (OE). The behavioral beliefs measures asked the respondents to rate their level of agreement about implementing a sustainable waste management program in their facility, from 1 strongly disagree to 5 strongly agree. The outcome evaluation measures rated the importance level for implementing a sustainable waste management program on a 5-point scale from 1 not important to 5 very important. The total attitude score was obtained by the following formula:

$$AB = \sum BB_i OE_i / 8$$

**Subjective norms.** Eight subjective norms were identified through the literature review, newly released NACUFS sustainability guide, and the results of the focus group study. Subjective norms were measured in two parts – normative beliefs (NB) and motivation to comply (MC). The normative beliefs measures asked each respondent to

rate how likely those eight referent groups or individuals would support the implementation of a sustainable waste management program in their operation, from 1 extremely unlikely to 5 extremely likely. The number 6 was used if an item didn't relate to the operation. The motivation to comply measures rated how likely their implementation of a sustainable waste management decision would be influenced by those eight groups or individuals on a 5-point scale from 1 extremely unlikely to 5 extremely likely. The number 6 was used if an item didn't relate to the operation. According to Chen (2007), the total subjective norms score was obtained by the following formula:

$$SN = \sum NB_i MC_i / 8$$

**Barriers.** Sixteen barriers (B) were identified in the literature, newly released NACUFS sustainability guide, and the focus group study. Barriers were measured by asking the respondents to rate the level of agreement for barriers to implementing sustainable waste management program on a 5-point scale from 1 strongly disagree to 5 strongly agree. The total barriers score was obtained by the following formula:

$$B = \sum Bi / 16$$

**Behavioral Intention.** Three behavioral intentions (BI) items were measured by asking the respondents to rate how likely they are implementing sustainable waste management practices in their foodservice facility using the scale 1 being extremely unlikely to 5 being extremely likely. The total barriers score was obtained by the following formula:

$$BI = \sum BI_i / 3$$

*Foodservice operation characteristics and demographic variables.* Thirteen questions requested information about the characteristics of the foodservice operations: the status of the college and university (private vs. public); size of the school based on the foodservice budget; management type of the foodservice dining facility; the number of meals served per lunch or dinner meal; size of the community where the foodservice facility is located; size of the foodservice dining facilities; if the foodservice was self-operated or contract managed; if the foodservice facility has a campus wide or foodservice sustainability committee; and geographic location of the operation. Demographic characteristics asked included: current position, gender, age, educational level, and work experience.

### **Pilot Test of the Questionnaire**

Litzinger and Felder (2005) stated it is always important to know the validity and reliability of the research questionnaire. Validity ensures that the instrument is measuring what it is intended to measure and reliability refers to the consistency of a measure. In this study, descriptive and analytical statistics were computed and included frequencies, means, and standard deviations (Miller, 2009; Taherian, 2010).

Two hundred and thirty ( $n = 230$ ) randomly selected university dining service directors, assistant directors, managers, or administrators from the sample population were contacted and asked to participate in the pilot study. Cronbach (1951) was used to determine reliability of the measures in the pilot study. A threshold of .70 was used to demonstrate consistency. Questionnaires were sent through e-mails requesting participation and were instructed to click on a URL to access the survey (timeline: two weeks) that included a section requesting feedback about the instrument itself (Appendix

C). These directors, assistant directors, managers, or others were not included in the final sample. Reminder e-mails were sent one week after the initial e-mailing to encourage completion by non-respondents. Of the 230 e-mails, 55 e-mails were undeliverable and were returned to the sender. The total number of responses was 17 participants for a 10% response rate. The pilot study results indicated that the measurements were reliable with Cronbach's alpha: *attitudes (behavioral beliefs* Cronbach's alpha = .86; *outcome evaluations* Cronbach's alpha =.83), *subjective norms (normative beliefs* Cronbach's alpha =.81; *motivation to comply* Cronbach's alpha =.80), *barriers* (Cronbach's alpha =.82), and *behavior intentions* (Cronbach's alpha =.96).

### **Final Instrument**

Based on the results of the focus group and pilot study responses, changes in the questionnaire design and wording were made. The final version of the instrument included 89 questions that measured current sustainable waste management practices, attitudes, social norms, barriers and intentions to implementing a sustainable waste management program, operational characteristics, and respondent demographics (Appendix D). The instrument was administered via e-mails. The online version of the instrument included scripting to assure data was uniformly collected (Appendix D).

### **Data Collection and Statistical Analyses**

Members of the National Association of College & University Food Services (NACUFS) were asked to participate in an online questionnaire facilitated by Axio Survey system at Kansas State University. A cover letter e-mail (Appendix E) was sent explaining the objectives of the research, introducing the instrument, its research goals, and a timeframe for completion. To encourage participation, one reminder e-mail was

delivered one week following the initial email letter. All data were analyzed using SPSS (Version 17.0, 2007, SPSS Inc, Chicago, IL).

The independent variables were: (1) NACUFS members' attitudes toward sustainable waste management, (2) NACUFS members' subjective norms toward sustainable waste management, (3) barriers toward sustainable waste management, (4) differences of foodservices directors by region of the country, age, facility sustainability committee status, and the budget of the operation. The dependant variable was behavioral intention to implement a sustainable waste management program. Statistical significance was set at  $p \leq 0.05$ . The procedural steps used in the data analysis are outlined in Figure 3.2.

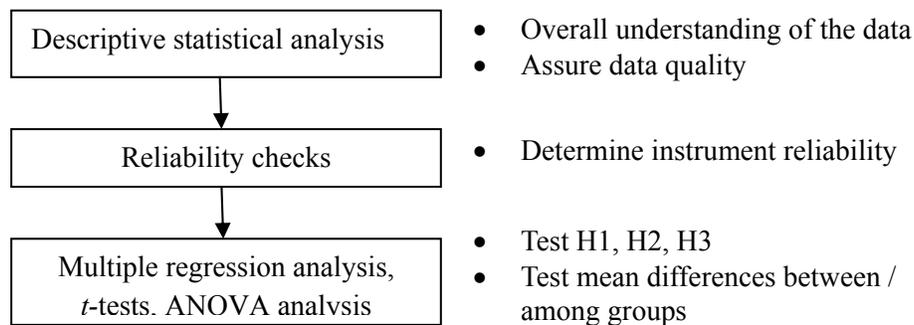


Figure 3.2 Data Analysis Procedures

Multiple linear regression analysis was used in the study to test the hypotheses: to examine the relationships between the dependent variable (behavioral intention to implement a sustainable waste management program) and the independent variables (attitude, subjective norms, & barriers toward SWM (Bobko, 2001). T-tests and ANOVA were used to identify the differences in intention to implement a sustainable waste management program based on characteristics of the respondents' age, size of facility, region of the country and if the facility had a sustainable waste management committee.

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## **CHAPTER 4 – Factors Influencing Intention to Implement Sustainable Waste Management Programs in College and University Foodservice Operations**

### **Abstract**

**Objectives:** The primary purposes of this study were to ascertain what sustainable waste management (SWM) programs have been implemented in college and university foodservices operations and determine how NACUFS members' attitudes, subjective norms, and barriers affect the implementation of additional SWM programs based on the Theory of Planned Behavior (TPB). A secondary purpose was to identify the differences in intention to implement additional sustainable waste management programs based on characteristics of the respondents' age, size of facility, region of the country and if the facility had a sustainable waste management committee.

**Design:** An instrument was developed through reviewing the literature, conducting five focus groups, and administering a pilot study. The final instrument was e-mailed to participants.

**Sample:** The population (N = 2,184) for this study was members of the National Association of College and University Food Service (NACUFS). Members of NACUFS who have e-mail addresses listed in the NACUFS 2009 Membership Directory were invited to participate in the study.

**Results:** The total number of responses was 212 resulting in a 13.5% response rate. The results indicated that attitude and subjective norms play a key role in determining foodservice directors' intentions to implement a SWM program in their facility. Barriers were not significantly associated with NACUFS members' intention to implement a SWM program. Whether the foodservice has sustainability committee was the only

factor that significantly differentiates the level of NACUFS members' intentions to implement a SWM program.

**Conclusions / applications:** The majority of respondents have implemented some form of a SWM program. Both attitudes and subjective norms significantly affected their intentions to implement additional SWM programs ( $p \leq .05$ ). Barriers identified in this survey did not affect behavior intention, thus the TPB model was not fully supported. Thus, during training and informational meetings, NACUFS may want to emphasize the positive aspects of implementing these programs, that members should consider those around them when considering implementing a SWM program, and the importance of developing a SWM committee within the operation.

**Keywords:** Sustainable waste management, theory of planned behavior, college and university foodservice

## **Introduction**

Today, the rapid development of modern science and technology has allowed humans to use many of these technological conveniences to improve daily life. At the same time because of these improvements and population growth, humans are facing serious challenges of global warming, overrun of solid waste materials and environmental pollutants, natural resource depletion, biodiversity loss, decreased air quality, increase in acid rain, ozone depletion and many other critical environmental issues which need urgent solutions to avoid long-term and irreversible damages to our climate (Goodland, 1995; Hedin & Likens, 1996; Last, 1993).

Along with the increasing number of environmental challenges and large quantities of energy demands, many have begun to be concerned about the environment and relate to it as the “Going Green” movement (Pyle, 2008). As a result, the concepts of sustainability have begun to gain momentum in various functions and activities in the hospitality and tourism industries (Micheal, 1999), and strategies for sustainable development are being adopted by governments, institutions, operations, and individual households (Citizens United for Renewable Energy and Sustainability [CURES], 2006).

In general, sustainability is defined as maintaining a process over time to meet the needs of the present without jeopardizing the ability to meet the needs of the future (Tastow & Harmon, 2008), and deals with quality of life in the social, economical, and ecological environments (Sumberg, 2008; Sustainable Measures, 2006). Each year, Americans throw away about 50 billion food and drink cans, 27 billion glass bottles and jars, and 65 million plastic and metal jar and can covers. More than 30% of these wastes

are packaging materials (EPA, 2008). Adopting waste reduction programs conserves valuable resources and may reduce operational costs, solid waste pollution, energy and landfill space (Winter & Azimi, 1996).

Many of the sustainable strategies implemented in hospitality operations have been to: (1) protect the environment, (2) provide better ways to meet customers' needs through "green" operations, (3) cut down waste and costs, (4) increase environmental-related governmental policies and regulations, (5) gain more competition power for "green" markets, (6) boost employee morale, (7) limit risks, and (8) build a strong reputation and public relations (Enz & Siguaw, 1999; Morgan, 2007).

Lodging corporations which have implemented sustainability programs include Accor, Carlson Hotels Worldwide, Hyatt, Hilton, Intercontinental Hotel Group, Marriott, Rizzor, and Starwood. With approximately 4.5 million rooms at 48,000 hotel and motel properties in the U.S., this industry offers a large contribution for energy-saving and environmental protection (Construction Art, 2008). Restaurant chains that have joined the sustainability movement include McDonald's, Starbucks, Pizza Fusion, KFC-Taco Bell, Denny's Corporation, Chipotle Mexican Grill, Inc., and Subway. They have implemented recycling programs, resource conservation (water, energy) and food waste composting.

Colleges and universities have a unique opportunity to manage waste by using resources efficiently and effectively, collecting materials for recycling and reusing, and composting food wastes (Wie & Shanklin, 2001). These actions can assist them in enhancing their reputation while reducing costs and contributing to a better community. Many colleges and universities have joined this sustainability effort by participating in

the green campus competition. By doing so, more schools are taking action on sustainability measures, which reflects the increasing concern about the environment (Sustainable Endowments Institute [SEI], 2008). Most NACUFS members have realized their role in sustainability by conserving water and energy through waste management to include: (1) recycling, (2) grab-n-go packaging, and (3) food waste composting.

As part of an aggressive recycling program, the Massachusetts Institute of Technology, The University of Vermont, University of Oregon, Dickenson College, and Colorado State University foodservices started to reduce waste by encouraging students to use fewer napkins and take only what they can eat. More recently, Dickenson College sold homemade reusable to-go bags for the students for use with Grab-n-Go to avoid wasting plastic disposable bags. Reusable bags, disposable containers, and once packaging reduction are incentives for students to reduce waste and can educate incoming freshmen about sustainable practices (Brown & Eaton, 2007). The University of Vermont dining services collects food waste from several locations and composts it using the Interval Compost Facility (University of Vermont, 2008).

Kelly (2003) stated that the first step in starting a green program is to understand what sustainability is and is not because sustainability is a broad and complex term (Aber, Kelly, & Mallory, 2009). To date, few studies have been published that measure how NACUFS members are responding to sustainable waste management practices and the newly released Sustainability Guide published by NACUFS in September 2009. This guide offers assistance with sustainable implementation, sustainability best practices, the critical sustainability areas, questions to consider before making decisions or taking actions about sustainability programs, and important measures for assessing the

effectiveness of sustainability programs (Boss, 2009). Several reports have found that college and university foodservices directors, assistant directors, managers, and others are facing specific challenges to implementing sustainable waste management programs, which include lack of funding, lack of training, inability to purchase local products, lack of support, lack of interest of employees to change, lack of staff, tools, and time (Shanklin et al, 2003; University of Vermont, 2007).

College and university foodservice directors, assistant directors, managers, and others are playing an important role in environmental stewardship, yet they may not apply their knowledge to developing practical outcomes and solutions. To date, no research has been found that measures what sustainable waste management practices college and university foodservice facilities have implemented. Also, research to determine NACUFS members' current attitudes, subjective norms, barriers, and intention to implement sustainable waste management programs would be valuable to NACUFS members (Aber et al., 2009).

The primary purposes of this study were to ascertain what SWM programs have been implemented at the college and university foodservices operations, and determine how NACUFS members' attitudes, subjective norms, and barriers affect the implementation of additional SWM programs based on the Theory of Planned Behavior (TPB). A secondary purpose was to identify the differences in intention to implement additional sustainable waste management programs based on characteristics of the respondents' age, size of facility, region of the country and if the facility had a sustainable waste management committee.

## **Hypothesis Development**

Cotter (2007) stated that significant relationships were found between pro-environment behaviors and several factors, such as sense of responsibility, perceived control and knowledge about sustainability. Attitude and subjective norms about sustainability, therefore, would influence “green movement” intentions based on Ajzen’s (1991) theory of planned behavior (TPB). It is believed that when NACUFS members have a positive attitude about implementing a sustainable waste management program, they will more likely “behave” by implementing a “sustainable waste management program.” Also, if NACUFS members feel social pressure from others around them about sustainable development, they will more likely “behave” by implementing a “sustainable waste management program” (Chen, 2008).

Several authors have reported that college and university foodservices directors, assistant directors, managers, and others are facing specific barriers to implementing a sustainable waste management program due to lack of funding, lack of training, inability to purchase local products, lack of support, lack of interest of employees to change, lack of staff, tools, and time (Shanklin et al, 2003; University of Vermont, 2007). If NACUFS members perceive fewer barriers about sustainable development, then the intention to implement a sustainable waste management program could be higher. By contrast, if NACUFS members perceive more barriers, their intentions to implement a SWM program may be lower (Chen, 2008; Shanklin et al, 2003; University of Vermont, 2007). The following hypotheses, therefore, were constructed for the present study:

**Hypothesis 1:** NACUFS members' attitudes toward implementing a sustainable waste management program positively affect their intentions to implement a sustainable waste management program.

**Hypothesis 2:** Subjective norms of NACUFS members positively affect their intentions to implement a sustainable waste management program.

**Hypothesis 3:** The barriers of implementing a sustainable waste management program negatively affect NACUFS members' intentions to implement a sustainable waste management program.

## **Methodology**

**Study Sample & Participants.** The population ( $N = 2,184$ ) for this study were members of NACUFS who have e-mail addresses listed in the 2009 NACUFS Membership Directory (NACUFS Membership Directory). Members in the directory were sorted by membership regions: Continental ( $n = 206$ ), Northeast ( $n = 448$ ), Mid-Atlantic ( $n = 235$ ), Midwest ( $n = 523$ ), Pacific ( $n = 370$ ), and Southern ( $n = 402$ ). A response rate of 15% ( $n = 328$ ) was desired to conduct statistical analysis. The research protocol was reviewed and approved by Kansas State University Institutional Review Board for Research on Human Subjects.

**Focus groups.** Kansas State University foodservice directors, assistant directors, managers, and administrators ( $n = 25$ ) were asked to participate in the five focus groups. This included 20 self-operation managers and five employed by a contract company. Participants responded to five open-ended questions based on the TPB and included: (1) can you please describe some good things that can come from implementing sustainable waste management practices in your facility; (2) what are some bad things

that can come from implementing sustainable waste management practices in your facility; (3) list all the people you think either approve or disapprove whether or not you implement sustainable waste management practices in your facility; (4) what makes, or would make, it easier for you or other managers to implement sustainable waste management practices in your facility, and (5) what makes it difficult for you or other managers to implement waste management practices in your facility (Appendix B). The pilot instrument was developed from their responses, through a review of literature, and the NACUFS Sustainability Guide (Boss, 2009).

***Questionnaire development.*** The survey instrument included six sections: (1) foodservice operations' current sustainable waste management practices; (2) NACUFS members' attitudes about implementing a sustainable waste management program; (3) NACUFS members' subjective norms to implementing a sustainable waste management program; (4) barriers toward implementing a sustainable waste management program; (5) NACUFS members' intentions to implementing a sustainable waste management program; and (6) demographic and operational characteristics of NACUFS members and foodservice facilities.

## **Measurements**

***Current sustainable waste management practices.*** The final instrument was developed by reviewing literature, conducting five focus groups, and administering a pilot study. This section included two parts: (1) items recycled in the foodservice facility; (2) past sustainable waste management programs in the foodservice facility. The measures required respondents to mark *Yes* or *No* for NACUFS members to evaluate their current sustainable waste management practices.

**Attitudes.** Eight items measured NACUFS members' attitude toward the behavior (AB) about implementing a SWM program (customer satisfaction, reducing food waste, better for the environment, decreasing costs, good for the community, increasing employee support, giving us a better reputation on campus, giving us an advantage over our competition). NACUFS members' attitudes were measured in two parts - behavioral beliefs (BB) and outcome evaluation (OE). The behavioral beliefs measures asked the respondents to rate their level of agreement about implementing a sustainable waste management program in their facility, from 1 strongly disagree to 5 strongly agree. The outcome evaluation measures rated the importance level for implementing a sustainable waste management program on a 5-point scale from 1 not important to 5 very important. According to Chen (2007), the total attitude score was obtained by the following formula:

$$AB = \sum BB_i OE_i / 8$$

**Subjective norms.** Eight subjective norms (SN) were identified through the literature review, newly released NACUFS sustainability guide, and the results of the focus group study. Subjective norms were measured in two parts – normative beliefs (NB) and motivation to comply (MC). The normative beliefs measures asked each respondent to rate how likely those eight referent groups or individuals would support the implementation of a sustainable waste management program in their operation, from 1 extremely unlikely to 5 extremely likely. The number 6 was used if an item didn't relate to the operation. The motivation to comply measures rated how likely their implementation of a sustainable waste management decision would be influenced by those eight groups or individuals on a 5-point scale from 1 extremely unlikely to 5

extremely likely. The number 6 was used if an item didn't relate to the operation. According to Chen (2007), the total subjective norms score was obtained by the following formula:

$$SN = \sum NB_i MC_i / 8$$

**Barriers.** Sixteen barriers (B) were identified in the literature, newly released NACUFS sustainability guide, and the focus group study. Barriers were measured by asking the respondents to rate the level of agreement for barriers to implementing sustainable waste management program on a 5-point scale from 1 strongly disagree to 5 strongly agree. The total barriers score was obtained by the following formula:

$$B = \sum CB_i / 16$$

**Behavioral Intention.** Three behavioral intentions (BI) items were measured by asking the respondents to rate how likely they are implementing additional sustainable waste management practices in their foodservice facility using the scale 1 being extremely unlikely to 5 being extremely likely. The total barriers score was obtained by the following formula:

$$BI = \sum BI_i / 3$$

**Demographic variables.** Thirteen questions requested demographic information about the status of the college or university (private vs. public); size of the school based on the foodservice budget; management type of the foodservice dining facility; the number of meals served per lunch or dinner meal; size of the community where the university is located; budget of the foodservice facility; if the foodservice was self-operated or contract managed; if the foodservice facility has a campus wide or foodservice sustainability committee; and geographic location of the operation.

Questions asked of the individual respondents included current position, gender, age, educational level, and work experience.

***Questionnaire pilot test.*** Two hundred and thirty ( $n = 230$ ) randomly selected NACUFS members were contacted and asked to participate in the pilot study. They were sent an e-mail requesting participation and were instructed to click on a URL to access the survey that included a section requesting feedback about the instrument itself (Appendix C). These directors, assistant directors, managers, and others were not included in the final sample. Reminder e-mails were sent one week after the initial e-mailing to encourage completion by non-responders. Of the 230 e-mails, 55 e-mails were undeliverable and were returned to the sender. The total number of responses was 17 participants for a 10% response rate. The pilot study results indicated that the pilot study was reliable: *attitudes (behavioral beliefs* Cronbach's alpha = .86; *outcome evaluations* Cronbach's alpha =.83), *subjective norms (normative beliefs* Cronbach's alpha =.81; *motivation to comply* Cronbach's alpha =.80), *barriers* (Cronbach's alpha =.82), and *behavior intentions* (Cronbach's alpha =.96).

***Final instrument.*** Based on the results of the pilot study, changes in the questionnaire design and wording were made. The final version of the instrument included 89 questions that measured current sustainable waste management practices, attitudes, subjective norms, barriers and intentions to implementing a sustainable waste management program and respondent and operational demographic characteristics (Appendix D). A final Axio survey invitation e-mail with a cover letter e-mail explaining the objectives of the research and introducing the instrument was sent to the remaining

members of NACUFS ( $n = 2,184$ ). The cover letter e-mail explained the objectives of the research. A follow up e-mail was sent to encourage response (Appendix E).

## **Data Analysis**

All of the data were analyzed using SPSS (Version 17.0, 2007, SPSS Inc, Chicago, IL). Descriptive statistics were computed and included frequencies, means, and standard deviations. The instrument showed high reliability scores (Cronbach's alpha  $>.70$ ) for all scales. Cronbach (1951) was used to determine construct reliability. A threshold of  $.70$  was used to demonstrate consistency (Nunnally, 1978). Multiple linear regression analysis was used to test the hypotheses: to examine the relationships between the dependent variable (behavioral intention) and the independent variables (attitude, subjective norms, and barriers) (Bobko, 2001). Statistical significance was set at  $p \leq 0.05$ . T-tests and ANOVA were used to test the differences in factor means and item scores by NACUFS members' gender, age, geographical location, facility sustainability committee status, and the size of foodservice facility budget with intention to implement a SWM program.

## **Results**

Of the 2,184 NACUFS emails sent (which excluded pilot study participants), 402 (18.4%) were undeliverable and were returned to the sender, 212 (9.7%) were undeliverable due to retirement or change of jobs, so the final sample size was 1,570. The total number of responses was 212 resulting in a 13.5% response rate. The response rate for this study was lower than in other e-mail studies conducted with this population.

***Respondents characteristics.*** The majority of participants (63%) was over 45 years of age and had been employed in foodservice from 16 to more than 21 years (83%), and more than half of the participants (59.9%) were male. Approximately 59% of participants were foodservice directors, assistant directors, and 32.1% were managers. Almost three-fourths of the respondents (72.2%) had a college degree.

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Insert Table 4.1 here

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***Operational characteristics.*** More than half (62.3%) of the foodservice facilities in this study were public schools located in varying population areas. School size by budget was represented by 32.1% small (less than \$1M to \$8M), 27.8% medium (greater than \$8M to \$18M), and 37.7% large (greater than \$18M). More than half of the operations (55.7%) had a facility wide sustainability committee, and 84.4% of respondents had a campus wide sustainability committee (Table 4.1).

***Sustainable Waste Management Program Implementation.*** Table 4.2 shows the items most frequently recycled: cardboard (97.2%), office paper (94.8%), fats, oil and grease (92%), toner cartridges (85.8%), tin cans (79.7%), newspaper (77.8%), aluminum (77.4%), plastic products (76.9%), and glass (71.2%). Items least likely to be recycled were paper products 45.3% (e.g. napkins) and others (e.g. computers, clothing, and equipment). These findings agree with the results of Chen (2008) who reported that cardboard, fats and oils, and aluminum were the most frequently recycled items in college and university foodservices.

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Insert Table 4.2 here

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Waste management practices (Table 4.3) most frequently implemented were: providing waste receptacles for recyclables (82.1%); using reusable service ware (80.7%); ensuring all drains are routed through a grease trap (74.1%); training of sustainable waste management practices (72.2%); using biodegradable disposable products (71.2%); and using refillable containers for drinks (71.2%). The least implemented sustainable waste management practices were: partnering with others to reuse composted food waste (37.7%); using a pulper (35.8%); and performing a cost/benefit analysis for recycling programs (33%). The findings were similar to the previous findings. For example, Chen (2008) reported sustainable waste management practices least likely to occur in foodservice facilities were: composting and using a pulper.

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Insert Table 4.3 here

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***Attitudes.*** Perceived NACUFS members' *behavioral beliefs* and *evaluation outcomes* about implementing a sustainable waste management program are presented in Table 4.4.

*Behavioral beliefs* - Most NACUFS members believe that implementing a SWM program will be better for the environment ( $M = 4.61 \pm .70$ ); improves reputation ( $M = 4.39 \pm .69$ ); is better for the local community ( $M = 4.21 \pm .80$ ); and decreases food waste ( $M = 3.97 \pm .92$ ). Most NACUFS members showed less agreement that a SWM program will increase competitive power ( $M = 3.55 \pm .98$ ) and decrease costs ( $M = 3.15 \pm 1.13$ )

*Evaluation outcomes* - Respondents believe that implementing a SWM program is important because it can protect the environment ( $M = 4.42 \pm .77$ ); maintain customer satisfaction ( $M = 4.31 \pm .68$ ); reduce food waste ( $M = 4.12 \pm .72$ ); and improve their

reputation on campus ( $M = 4.08 \pm .66$ ). Least important included increasing competitive power ( $M = 3.63 \pm 1.09$ ) and employee job satisfaction ( $M = 3.60 \pm 1.12$ ).

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Insert Table 4.4 here

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**Subjective norms.** Perceived NACUFS members' *normative beliefs* and *motivation to comply* about implementing a sustainable waste management program are presented in Table 4.4. Results are similar to those conducted with other TPB studies which reported administrators and customers influenced their implementation decisions (Chen, 2008; Roberts & Barrett, 2008).

*Normative beliefs* - Participants reported that they believe those around them who would support implementation of a SWM (Table 4.4) included their superiors ( $M = 4.53 \pm .77$ ), college and university administration ( $M = 4.43 \pm .75$ ), and other university foodservice operations ( $M = 4.14 \pm .90$ ). Least likely were employees ( $M = 3.85 \pm .84$ ) and vendors or suppliers ( $M = 3.76 \pm .86$ ).

*Motivation to comply* - Participants reported that their sustainable waste management decisions were most likely influenced by their superiors ( $M = 4.47 \pm .81$ ), college and university administration ( $M = 4.37 \pm .76$ ), and students ( $M = 4.22 \pm .84$ ). They were not related by their employees ( $M = 3.44 \pm 1.02$ ) and vendors or suppliers ( $M = 3.25 \pm .97$ ).

**Barriers.** Barriers (Table 4.4) were not as important in the decision to implement a SWM as NACUFS members' attitudes and subjective norms. Most of participants agreed that the following items were barriers to implementing a SWM program: lack of financial resources ( $M = 3.92 \pm 1.20$ ); lack of campus coordination ( $M = 3.83 \pm 1.11$ );

lack of recycling facilities and storage areas ( $M = 3.83 \pm 1.15$ ); cost of recyclable, reusable products ( $M = 3.77 \pm 1.06$ ); and lack tools and resources ( $M = 3.52 \pm 1.00$ ).

Most of the respondents did not agree that lack of support from university administration and management training time were barriers to implementing a SWM program. In a similar study, Chen (2008) found that resources (e.g., financial & facility resources), time, and money were also the major barriers to implementing sustainable practices in college and university foodservice operations.

***Behavioral intentions.*** NACUFS members had favorable intentions to implement a SWM program as shown in (Table 4.4). These include continuing to develop SWM programs to reduce waste ( $M = 4.56 \pm .67$ ), increasing SWM practices in their operation ( $M = 4.49 \pm .77$ ); exploring the feasibility of implementing SWM programs ( $M = 4.43 \pm .80$ ). The results of this study were comparable to the study conducted by Chen (2008) about sustainable waste management practices in college and university foodservices.

***Regression analysis.*** Multiple linear regression explained over 21% ( $R^2 = .21$ ) of the variance and indicated that NACUFS members' attitudes had the most positive influence on NACUFS members' intentions to adopt a sustainable waste management program ( $\beta = .36$ ), followed by their subjective norms ( $\beta = .19$ ) (Table 4.5). Barriers did not have a significant influence on intention in this study, suggesting its influence on sustainable decisions might not be as important as attitudes and subjective norms for NACUFS members.

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Insert Table 4.5 here

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*Demographic differences.* In the present study there were no significant differences among NACUFS members' intentions to adopt a sustainable waste management program based on their age, geographic location, and the size of the foodservice facility. The only demographic that significantly ( $p \leq .001$ ) impacted NACUFS members' intentions to implement a sustainable waste management program was whether or not the college and university foodservice facility had a sustainability committee (Table 4.6).

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Insert Table 4.6 here

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## **Discussion**

The findings of the present study indicate that NACUFS members have implemented many SWM practices in their foodservice operations. This supports the report about sustainability efforts on college campuses, where among nine categories those college foodservices received the highest scores for recycling (SEI, 2008). SWM practices, however, most frequently implemented were less costly and required fewer resources, such as, providing waste receptacles for recyclables, using reusable service ware, ensuring all drains are routed through a grease trap, and training in sustainable waste management practices. The least implemented sustainable waste management practices required more time, money, and training, such as, partnering with others to reuse composted food waste, using a pulper, and performing a cost/benefit analysis for recycling programs.

The results indicate that NACUFS members' have positive attitudes about implementing sustainable waste management programs and important significant others

include superiors, university administration and students, but not employees, suppliers, or vendors. Barriers to implementing a SWM program included lack of financial resources, campus coordination, and recycling facilities. However, the perceived barriers did not significantly affect directors', assistant directors', managers', or administrators' intentions to continue implementing sustainable waste management programs.

When testing the TPB model, attitudes and subjective norms significantly impacted their intentions to implement a SWM program. Therefore, if their attitudes are positive and those around them who are important support the implementation, then it is more likely that will implement SWM programs.

In the current study, barriers were not significant to implementing a SWM program. These results are similar to those of Chen (2008) who used the TPB and found that barriers were insignificant in implementing sustainable waste management programs. The resources to do so, however, are not available, yet they don't appear to be concerned about these barriers. This may indicate that NACUFS members have the skills and knowledge to implement a SWM program and realize that in these times of cost savings, using resources for SWM programs is not the most efficient way to use their resources.

Findings in the present study suggested that the differences in size of the foodservice facilities, geographic locations, and age of NACUFS members' did not have any significant effect on NACUFS members' decisions to adopt a sustainable waste management program. The results of the present study are different from other reported findings, which have found that those who are younger are more likely to be concerned about sustainability (Gelissen, 2007; Heeswijk, 2008; Klineberg, McKeever, & Rothenbach, 1998). The discrepancy between the current study and previous studies may

be due to the lower percentage of younger respondents than other studies conducted with sustainability.

The results indicate that NACUFS members who had a facilities-wide sustainability committee ( $M = 4.67 \pm .47$ ,  $t = 4.56$ ,  $p < .001$ ) had a greater intention to implement a sustainable waste management program in their operations. NACUFS members, thus, might find it beneficial to create a foodservice sustainability committee to assist with implementing a SWM program.

## **Conclusions and Recommendations for Future Study**

The NACUFS organization in their 2009-2014 Strategic Plan has identified that they would implement a plan for maintaining sustainable resources (NACUFS, 2010). As a result, the concepts of sustainability are gaining momentum in their implementation of SWM programs and are on track to meet the goals of the NACUFS strategic plan (NACUFS, 2010). The majority of respondents have implemented some form of a SWM program and results showed they have positive attitudes about implementation and subjective norms who were important included superiors, university administration and students.

Both attitudes and subjective norms significantly affected the intention to implement a SWM program ( $p \leq .001$ ). Barriers to implementation were not significant, and the TPB model was not supported. Thus barriers identified in this survey did not affect behavior intention. This may be due to the fact that they are implementing many SWM practices already. Also, to assist in implementation, NACUFS has published a Sustainability Guide that provides information about sustainability best practices, the

critical sustainability areas for college and university foodservices, questions to consider before making decisions or taking actions in sustainability areas, and important measures for assessing the sustainability initiatives' effectiveness (Boss, 2009).

NACUFS members who have positive attitudes and subjective norms will be more likely to implement a SWM program. Therefore, during training, the NACUFS organization could emphasize the positive outcomes of implementing these programs in the operation and that members should listen to those around them when considering implementing a SWM program. Another suggestion would be for member schools to develop a sustainability committee within their operations.

Future studies in SWM implementation could explore the effectiveness of sustainability education and training programs or how implementing a sustainable waste management program impacts customer satisfaction, financial performance, and budget planning. Other types of foodservices such as for profit restaurants and healthcare could be studied to determine their attitudes, subjective norms and barriers to implementing a SWM program.

## **Limitations**

An important limitation of the present study was the low response rate (13.5%). Even though the total population was sampled, it may be difficult to generalize the findings to all NACUFS member schools. Efforts to increase participation would need to be implemented in future studies with this group. Also, surveys that are self-administered have limitations including both low respondent rate and non-response bias (Frickers &

Schonlau, 2002), which may be true in this case, because only those NACUFS members who may have been interested in or who had implemented a SWM responded.

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**Table 4.1 Respondents & Operational Characteristics (N=212)**

<b>Respondent Characteristics</b>	<b><i>n</i></b>	<b>%<sup>a</sup></b>
<b>Age</b>		
25 or less	3	1.4
26-35	16	7.5
36-45	59	27.8
46-55	86	40.6
56 or older	48	22.6
<b>Gender</b>		
Male	127	59.9
Female	85	40.1
<b>Geographic Location</b>		
Continental	21	9.9
Northeast	45	21.2
Mid-Atlantic	23	10.8
Midwest	66	31.1
Pacific	29	13.7
Southern	28	13.2
<b>Years employed in foodservice</b>		
5 or less	8	3.8
6-10	9	4.2
11-15	19	9.0
16-20	31	14.6
21 or more	145	68.4
<b>Education</b>		

<b>Position</b>	High School/GED	3	1.4
	Some College	30	14.2
	Associate Degree	26	12.3
	Bachelors	104	49.1
	Advanced Degree	49	23.1
	Director	85	40.1
	Assistant Director	40	18.9
	Manager	68	32.1
	Other	19	9.0
<b>Operational Characteristics</b>		<b><i>n</i></b>	<b><i>%<sup>a</sup></i></b>
<b>Status of school</b>			
	Private	80	37.7
	Public	132	62.3
<b>Size of school by budget <sup>b</sup></b>			
	Small (less than \$1 -\$8 Million)	68	32.1
	Medium (greater than \$8 -\$18 Million)	59	27.8
	Large (greater than \$18 Million)	80	37.7
<b>Management Type</b>			
	Self-operated	167	78.8
	Contract managed	40	18.9
<b>Campus wide sustainability Committee</b>			
	Yes	179	84.4
	No	28	13.2
<b>Facility wide sustainability committee</b>			

	Yes	118	55.7
	No	91	42.9
<b>Size of the community where facility located</b>			
	Less than 50,000 people	73	34.4
	Between 50,000-100,000 people	63	29.7
	Greater than 100,000 people	71	33.5
<b>Operation-scale by # of meals served (lunch/dinner)</b>			
	Small-scale (0-99 servings)	1	.5
	Medium-scale (100-499 servings)	25	11.8
	Large-scale (500-999 servings)	49	23.1
	Very large-scale (1000 or over)	137	64.6

*Note:* <sup>a</sup> Frequency of responses percentages may not add to 100% due to rounding  
<sup>b</sup> Size of school determined based on the budget listed on NACUFS membership directory

**Table 4.2 Items recycled (N=212)**

<b>Measures</b>	<b>Yes</b>	<b>Frequency (%)<sup>a</sup></b>	<b>No</b>	<b>Frequency (%)<sup>a</sup></b>
1 Cardboard	206	97.2	6	2.8
2 Office Paper	201	94.8	11	5.2
3 Fats, oil and grease	195	92.0	17	8.0
4 Toner Cartridges	182	85.8	30	14.2
5 Tin Cans	169	79.7	43	20.3
6 Newspaper	165	77.8	47	22.2
7 Aluminum (e.g. cans, foil)	164	77.4	48	22.6
8 Plastic Products	163	76.9	49	23.1
9 Glass	151	71.2	61	28.8
10 Paper Products (e.g. napkins)	96	45.3	116	54.7
11 Other:	26	12.3	186	87.7

*Note:* <sup>a</sup> Frequency of responses percentages may not add to 100% due to rounding

**Table 4.3 Waste Management Practices (N=212)**

<b>Measures</b>	<b>Yes</b>	<b>Frequency (%)<sup>a</sup></b>	<b>No</b>	<b>Frequency (%)<sup>a</sup></b>
1 Provide waste receptacles are marked to segregate recyclables.	174	82.1	38	17.9
2 Use reusable service ware (e.g. cups and glassware).	171	80.7	41	19.3
3 Ensure all drains are routed through a grease trap.	157	74.1	55	25.9
4 Sustainable waste management practices training.	153	72.2	59	27.8
5 Use biodegradable disposable products.	151	71.2	61	28.8
6 Use refillable containers for drinks.	151	71.2	61	28.8
7 Monitor customer food waste to develop policies.	116	54.7	96	45.3
8 Compost food waste.	115	54.2	97	45.8
9 Operate a tray-less dining service.	106	50.0	106	50.0
10 Donate reusable (e.g. leftover food, old uniforms, and linens).	95	44.8	117	55.2
11 Track usage of energy, gas, and water.	95	44.8	117	55.2
12 Purchase products with less packaging.	91	42.7	121	57.1
13 Develop solid waste reduction strategies.	89	42.0	123	58.0
14 Partner with others to use composted waste.	80	37.7	132	62.3
15 Use a pulper.	76	35.8	136	64.2
16 Performing a cost/benefit analysis for recycling programs.	70	33.0	142	67.0
17 Other:	5	2.40	207	97.6

Note: <sup>a</sup> Frequency of responses percentages may not add to 100% due to rounding

**Table 4.4 Attitude, subjective norms, barriers for implementing SWM programs.**

<b>Attitude - Behavioral beliefs (BB)<sup>a,3</sup></b> (Reliability: <i>Cronbach's alpha .80</i> )		<b>M<sup>1</sup></b>	<b>SD<sup>2</sup></b>
1	Implementing a SWM program will be better for the environment.	4.61	.70
2	Implementing a SWM program will give us a better reputation.	4.39	.69
3	Implementing a SWM program will be good for the local community.	4.12	.80
4	Implementing a SWM program will decrease food waste.	4.08	.92
5	Implementing a SWM program will improve customer satisfaction.	4.08	.82
6	Implementing a SWM program will be supported by our employees.	3.69	.77
7	Implementing a SWM program will give increase competition power.	3.61	.98
8	Implementing a SWM program will decrease costs.	3.59	1.13
<b>Attitude - Outcome evaluation (OE)<sup>a,4</sup></b> (Reliability: <i>Cronbach's alpha .86</i> )			
1	Protecting the environment		
2	Maintain customer satisfaction	4.36	.75
3	Reducing food waste	4.26	.81
4	Improving reputation on campus	4.23	.96
5	Decreasing costs	4.08	.89
6	Benefiting the local community	3.94	1.02
7	Giving us a competitive advantages over our competition	3.63	1.09
8	Increasing employee job satisfaction	3.60	1.12
<b>Subjective norms - Normative beliefs (NI)<sup>b,5</sup></b> (Reliability: <i>Cronbach's alpha .80</i> )			
1	Your superiors	4.53	.77
2	College and university administration	4.43	.75
3	Other university foodservice operations	4.14	.90
4	University faculty and staff	4.09	.80
5	The students who dine in your facility	4.06	.79

6	The citizens of the local community	3.95	.88
7	Your employees	3.85	.84
8	Vendor(s) / Supplier(s)	3.76	.86
<b>Subjective norms - Motivation to comply (MI)<sup>b,5</sup> (Reliability: Cronbach's alpha .75)</b>			
1	Your superiors	4.47	.81
2	College and university administration	4.37	.76
3	The students who dine in your facility	4.22	.84
4	University faculty and staff	3.82	.87
5	Other university foodservice operations	3.67	1.01
6	The citizens of the local community	3.52	1.04
7	Your employees	3.44	1.02
8	Vendor(s) / Supplier(s)	3.25	.77
<b>Barriers to implement SWM programs<sup>6</sup> (Reliability: Cronbach's alpha .86)</b>			
1	Lack of financial resources	3.92	1.20
2	Lack of campus coordination	3.83	1.11
3	Lack of recycling facility and storage areas	3.83	1.15
4	Cost of recyclable, reusable products	3.77	1.06
5	Lack of tools and resources	3.52	1.00
6	Lack of training/education about how to implement	3.46	1.15
7	Overall cost of recycling	3.45	1.09
8	Lack of support by customers due to additional costs	3.34	1.10
9	Supervision required for employees to follow the tasks	3.29	.92
10	Lack of quality recyclable products available for purchase	3.27	1.14
11	Lack of ability to create lasting changes	3.17	1.14
12	Time for managers to implement	3.17	1.08

13	Lack of interest/willingness of employees to change	3.08	1.10
14	Required training time for employees	3.06	.97
15	Lack of support from university administration	2.95	1.21
16	Manager training time	2.95	1.10
<b>Behavior intention to implement SWM programs</b> <sup>7</sup> (Reliability: <i>Cronbach's alpha</i> .87)			
1	Continue developing SWM to reduce waste.	4.56	.67
2	Increase SWM practices.	4.49	.77
3	Explore SWM programs.	4.42	.80

Note. <sup>1</sup>M = mean

<sup>2</sup>SD = standard deviation

<sup>a</sup>AB = Attitude toward the behavior; BB = Behavioral beliefs; OE = Outcomes evaluation;  $AB = \sum BB_i OE_i / 8$

<sup>3</sup>Behavioral beliefs scale: 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree

<sup>b</sup>SN = Subjective norms; NI = Normative beliefs; MI = Motivation to comply;  $SN = \sum NB_i MC_i / 8$

<sup>4</sup>Outcomes evaluation scale: 1 = not important to 5 = very important

<sup>5</sup>Normative beliefs and motivation to comply scales: 1 = extremely unlikely to 5 = extremely likely

<sup>6</sup>Barriers scale: 1 = strongly disagree to 5 = strongly agree

<sup>7</sup>Behavior intention scale: 1 = extremely unlikely to 5 = extremely likely

**Table 4.5 Regression Analysis of Intention to Implement SWM Programs: (N=212)**

<b>Measures</b>	<b>B</b>	<b>SE</b>	<b><math>\beta</math></b>	<b><i>t</i></b>
Constant	3.397	.302		11.253
Attitude	.007	.001	.356	5.261 ***
Subjective Norms	.004	.002	.185	2.730 ***
Barriers	-.113	.066	-.105	-1.713

**$R^2 = .21$**

\*\*\*  $p \leq .001$

**Table 4.6 Demographic factors influence on behavior intentions to implement SWM programs**

<b>Behavior Intention Measures</b> <sup>3</sup>	<b>n</b> <sup>1</sup>	<b>M</b>	<b>SD</b> <sup>2</sup>	<b>t</b>
<b>Age of the Foodservice Directors</b>				- .88
45 or less	78	4.43	.75	
46 or greater	134	4.52	.61	
<b>Facility Wide Sustainability Committee</b>				4.56 ***
Yes	118	4.67	.47	
No	91	4.27	.80	
<b>Behavior Intention Measures</b> <sup>3</sup>				<b>F</b>
<b>Size of the Foodservice Facility</b>				
Small (less than \$1 M-\$8M)	68	4.41	.69	1.83
Medium (greater than \$8M-\$18M)	59	4.49	.51	
Large (greater than \$18M)	80	4.57	.74	
<b>Geographic Location</b>				.77
Midwest	66	4.70	.67	
Northeast	45	4.59	.68	
Continental	21	4.52	.45	
Southern	28	4.51	.58	
Mid-Atlantic	23	4.42	.69	
Pacific	29	4.38	.82	

<sup>1</sup> M = mean;

<sup>2</sup> SD = standard deviation

<sup>3</sup> Behavior intention scale: on a 5-point scale, from 1 = extremely unlikely to 5 = extremely likely

\*\*\* $p < .001$

## **CHAPTER 5: Summary and Conclusions**

In this chapter, the major findings of the present research are summarized in the context of the research objectives stated in the first chapter. In addition, several implications for foodservice professionals and researchers are discussed. Additionally, limitations and future research suggestions are presented.

### **Findings and Summary**

Business operators have a difficult time isolating recyclable waste from regular trash due to their working hours, diversity of functions and immediacy of quality service (EPA, 2008). Previous research has found that adopting sustainable waste management programs in organizations conserves valuable resources and may cut down on operational costs.

The primary purposes of this study were to ascertain what sustainable waste management (SWM) programs have been implemented in college and university foodservice operations, and determine how NACUFS members' attitudes, subjective norms, and barriers affect the additional implementation of a SWM programs based on the Theory of Planned Behavior (TPB). A secondary purpose was to identify the differences in intention to implement additional sustainable waste management programs based on characteristics of the respondents such as age, size of facility, region of the country and if the facility had a sustainable waste management committee.

The initial research instrument was developed based on the review of literature and responses from five focus groups. Kansas State University foodservice facilities management level employees ( $n = 25$ ) were asked to participate in interview focus

groups. Participants responded to five open-ended questions related to the TPB. These included attitudes, subjective norms and barriers about implementing a sustainable waste management program (Appendix B). Changes to the instrument were made based on their feedback.

Two hundred and thirty ( $n = 230$ ) randomly selected university dining service directors, managers, and administrators from the sample population were contacted and asked to participate in a pilot study. They were sent an e-mail asking them to respond to the pilot study by clicking on a URL to access the survey which included a feedback section (Appendix C).

The final version of the instrument included 89 questions to measure current sustainable waste management practices, attitudes, social norms, barriers and intentions to implement a sustainable waste management program and respondent and operational demographic characteristics (Appendix D). The instrument was administered via e-mails. Of the 2,184 NACUFS emails sent, 402 (18%) were undeliverable and were returned to the sender; 212 (10%) were undeliverable due to participants retirements or change of jobs for a total sample of 1,570. The total number of responses was 212 resulting in a 13.6% response rate.

## **Major Findings**

Multiple linear regression models were used to test each of the three hypotheses. Results of the hypotheses testing are summarized as follows:

***Hypothesis 1:*** NACUFS members' attitudes toward implementing a sustainable waste management program positively affect their intentions to implement a sustainable waste management program.

Hypothesis one is supported. Results indicate that NACUFS members' attitudes played an important role in predicting a NACUFS member's behavioral intention to implement a sustainable waste management ( $\beta = .356, p \leq .001$ ). Similar results have also been found in several TPB studies (Chen, 2008; Martin, Julinna, Eklund, & Reed, 2001).

**Hypothesis 2:** Subjective norms of NACUFS members positively affect their intentions to implement a sustainable waste management program.

Hypothesis two is supported. Results indicate that members' subjective norms played an important role in predicting a NACUFS member's intention to implement a sustainable waste management program in their operations ( $\beta = .185, p \leq .001$ ). Chen (2008) and Martin, Julinna, Eklund, & Reed (2001) found that subjective norms were an important consideration in predicting behavioral intention in their studies which utilized the TPB.

**Hypothesis 3:** The barriers of implementing a sustainable waste management program negatively affect NACUFS members' intentions to implement a sustainable waste management program.

Hypothesis three is not supported because the results indicate that barriers to implementation were not significant in the prediction of behavioral intention ( $\beta = -.105, p = .088$ ). Chen (2008) and Martin, Julinna, Eklund, & Reed (2001) found similar results in their studies.

## **Applications**

Results showed that attitude and subjective norms related to the behavior intention to implement a SWM program in college and university foodservice operations ( $p \leq .001$ ), but barriers identified in this survey were not related to behavior intention. Therefore, the

TPB model was not supported. Whether college and university foodservice has a sustainability committee was the only demographic that significantly influenced NACUFS members' intentions to implement a SWM program.

The majority of respondents have implemented some form of SWM programs that are inexpensive and don't require many resources such as time and skills. One recommendation, based on the results from the present study, is that NACUFS members should continue to follow-up with NACUFS the newly released Sustainability Guide and their 2009-2014 Strategic Plan to assist further in implementation (NACUFS, 2010).

Another recommendation would be for college and university foodservice directors, assistant directors, managers, and administrators to market their leading roles in sustainability to campus administration, students, and faculty. This marketing could lead to more resources and financial support because sustainability is an important issue and systems must be in place that meet the needs of human life and leave the environment healthy to produce resources for future generations (Rowe, 2010).

Because NACUFS members who have positive attitudes and important subjective norms are more likely to implement a SWM program, the NACUFS organization could emphasize the importance of implementing these programs in the operation and that members should listen to those around them when considering implementing a SWM program. Another suggestion would be for member schools to develop a sustainability committee within their operations.

## **Limitations and Future Research**

Limitations of the study include the low response rate (13.5%). Even though the total population was sampled, it may be difficult to generalize the findings to all

NACUFS member schools. Efforts to increase participation would need to be implemented in future studies with this group. Also, surveys that are self-administered have limitations including low response rate and no available data on non-response bias (Frickers & Schonlau, 2002), which may be true in this case, because only those respondents who may have been interested in or who had implemented a SWM may have responded. Furthermore, the survey was conducted only via the internet – online surveys. It is unknown how the use of different methods for delivery of the survey instrument might have affected answers to certain questions and response rates.

Because this study focused on identifying SWM implementation practices in college and university foodservices and their intentions to implement a sustainable waste management program, further research using this instrument could be conducted with more diverse hospitality professionals. Those groups could include foodservice directors, assistant directors, managers and administrators who are not members of NACUFS, those from restaurant associations, and healthcare and school foodservices. This would allow findings to be generalized to a broader population and to measure construct validity of the instrument. Because most directors and managers in the present study were older and had a lot of work experience, it would be beneficial to obtain data from younger managers to determine whether or not there is really a generational difference in SWM implementation which is a finding that was not evident in the results of this study. In addition, future studies could explore the effectiveness of sustainability education and training programs. Lastly, further research could be conducted to explore how implementing a sustainable waste management program impacts customer satisfaction, financial performance, and budgeting.

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## **Appendix A - Human Subjects Approval**



University Research  
Compliance Office  
203 Fairchild Hall  
Lower Mezzanine  
Manhattan, KS 66506-1103  
785-532-3224  
Fax: 785-532-3278  
<http://urco.ksu.edu>

TO: Elizabeth Barrett  
HMD  
107 Justin

Proposal Number: 5300

FROM: Rick Scheidt, Chair  
Committee on Research Involving Human Subjects

DATE: December 2, 2009

RE: Proposal Entitled, "College and University Dining Center Directors Green Movement Survey"

The Committee on Research Involving Human Subjects / Institutional Review Board (IRB) for Kansas State University has reviewed the proposal identified above and has determined that it is EXEMPT from further IRB review. This exemption applies only to the proposal - as written - and currently on file with the IRB. Any change potentially affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Based upon information provided to the IRB, this activity is exempt under the criteria set forth in the Federal Policy for the Protection of Human Subjects, 45 CFR §46.101, paragraph b, category: 2, subsection: ii.

Certain research is exempt from the requirements of HHS/OHRP regulations. A determination that research is exempt does not imply that investigators have no ethical responsibilities to subjects in such research; it means only that the regulatory requirements related to IRB review, informed consent, and assurance of compliance do not apply to the research.

Any unanticipated problems involving risk to subjects or to others must be reported immediately to the Chair of the Committee on Research Involving Human Subjects, the University Research Compliance Office, and if the subjects are KSU students, to the Director of the Student Health Center.

## **Appendix B - Moderator's Guide**

January 20, 2010

Dear Directors / Managers / Administrators,

Did you know that by 2030, global energy consumption is expected to be 55% higher than it was in 2008, at a rate of 2% per year, due to population growth, continued urbanization, and economic expansion? A recent government survey showed, by 2013, over 70% states in the United States will experience water shortages, and by 2025, four billion world citizens will live in serious water shortage stress conditions according to the U.S. Environmental Protection Agency (EPA, 2009). In order to help preserve resource supplies for future generations, save money, and protect human health & the environment, many have become concerned about sustainable development. The purpose of this research is to identify factors that influence college & university dining facility director's behavior about the green movement.

I am writing to invite you to participate in this project. Specifically, I am asking you to participate in a Focus group conducted by personal interviews in January, 2010. Your participation will help me in determining if the questionnaire is appropriate for college and university dining facility directors. As a gift for participating you will receive a gift card from Starbucks.

I expect that the time commitment for participation in the Focus Group will be about 30-40 minutes. Thank you for your involvement in this project.

By replying to me, you have agreed to participate in the interview section of this project, but your participation is completely voluntary. You have the right to refuse to participate in this study; you may withdraw consent at any time and stop participating at any time without explanation or penalty. If you have questions regarding this research, you may contact Rick Scheidt, Chair, Committee on Research Involving Human Subjects, 1 Fairchild Hall, Kansas State University, Manhattan, KS 66506, (785) 532-3224. If you have any specific questions about this research, you may contact my major professor, Dr. Betsy Barrett, 785-532-2208 or me at 785-317-6032.

Sincerely,

Ying (Zoe) Zhou, Master's Student  
Department of Hotel, Restaurant, Institution Management and Dietetics

## **Focus Group**

Pre Screening focus group of Green Movement Survey for College / University Dining Facilities

January, 2010

Interview Section

1. Nice to meet you, my name is Zoe. Thank you for coming. I have invited you to take part in a discussion in measuring directors' awareness, attitudes, barriers, and behaviors towards the green movement at college and university dining facilities. This is a research project, so I would like to go through point by point with you.
2. This is a focus group discussion, and it will last around 30-40 minutes. During this time, I would appreciate it if you could be open and honest in sharing your experiences and opinions with me. There is no right or wrong answer to any questions, yet your honest opinions will be very helpful to this study.
3. Don't be afraid of sharing some negative points if it is your opinion. Please make sure to explain why you think that way.
4. Program directors who participate in the Interview Focus Group members will be given a gift for appreciation.
5. Let's start this discussion by saying your first name, position, and how many years you have been served for college / university dining facility.

Close by summarizing the information shared

## **Appendix C - Pilot Test**

Dear Foodservice Directors,

At this time, the "going green" movement on sustainable waste management has become important for the stakeholders and administrators of many college campuses. Therefore, the purpose of this study is to identify factors that influence foodservice directors' decisions about sustainable waste management practices and to determine what sustainable waste management practices have been implemented in your operation. This is a pilot study and I need your feedback to improve the results. After you have completed the survey, there are 3 questions at the end of the survey for you to provide comments. Please take a few moments to make constructive comments. Your participation is important for assisting foodservice directors in implementing sustainable waste management practices within their operation. The survey will take about 15 minutes to be completed. Your participation is voluntary and the information you provide will remain anonymous.

Thank you very much for participating in this study. Survey participators will have an opportunity to win a \$25 Starbucks Coffee gift card for appreciation. Please enter your contact information in the survey if you would like to participate the drawing.

If you have general questions involving Human Subjects, you may contact Rick Scheidt, Chair, K-State Committee on Research at 785- 532-3224. If you have any specific questions about this research, you may contact me at 785-317-6032 or my major professor, Dr. Betsy Barrett at 785-532-2208.

The survey will be available until February 22, 2010. Here is the link:

<https://surveys.ksu.edu/TS?offeringId=158636>

Zoe Zhou, Masters Student, Betsy Barrett, Associate Professor, PhD, RD  
Department of Hospitality Management and Dietetics  
Kansas State University

### ***Opening instructions***

Please answer the questions honestly. At the end of the survey questionnaire, there are some other questions relating to the content and clarity of the questions.

#### ***Part One:***

Please provide your answers based on your attitude toward sustainable waste management programs in your foodservice dining facility. Make sure do not discuss them with anyone or using website as a help tool for answers. The survey is timed 😊

#### ***Part Two:***

Please indicate how important are the following when making a decision to implement a sustainable waste management program and how likely the following people would support the implementation of a sustainable waste management program in your operation.

***Part Three:***

The following items have been identified as barriers that prevent foodservice facilities from implementing sustainable waste management programs. Please indicate the extent to which you agree that the item makes sustainable waste management practices difficult.

***Part Four:***

Please indicate in the future how likely you are planning to implement additional sustainable waste management practices in your foodservice facility. Please select the following sustainable waste management practices that you have been done or intend to implement in the near future in your foodservice facility.

***Part Five:***

Please provide the following information about you.

***Survey Discussion***

Now I would like to review the information that I e-mailed to you. First of all, did you have a chance to review it? If not yet, here I made a copy for your quick review. After reviewing it, could you answer me a few feedback questions?

Please provide any insight you have concerning the content or clarity of the questions asked above. Also, please state if you think a certain question or practice is not applicable to college and university foodservice operations.

1. How do you feel about answering these questions? Do you think 15 minutes is long enough for you to finish the survey?
2. Did any of the questions seem to have content you did not understand or unclear to you?
3. Is there anything else that you would like to say about the survey? Are there any other changes you would make?

***Thank you very much for your time and participation.***

***Closing Message***

Thank you for participating in this pilot project. The result of this pilot survey will be used to improve the survey that will be sent to other child care operations. Your help is deeply appreciated.

Sincerely,

Ying (Zoe) Zhou (Master Student)  
Department of Hotel, Restaurant, Institution Management and Dietetics

- End of Survey -

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## **Appendix D - Final Instrument**

**COLLEGE AND UNIVERSITY DINING FACILITY FOODSERVICE  
DIRECTORS SUSTAINABLE WASTE MANAGEMENT SURVEY**

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**Question 1**

Which of the following items do you recycle in your foodservice facility? Please select all that apply.

- Office Paper
- Paper products (e.g. napkins)
- Newspaper
- Toner cartridges
- Cardboard
- Tin cans
- Aluminum (e.g. cans, foil)
- Glass
- Plastic products (e.g. plastic containers and plastic packaging)
- Fats, oil and grease
- Other:

**Question 2**

Please select the following sustainable waste management practices that have been implemented in your foodservice facility. Please select all that apply.

- Training employees about sustainable waste management practices.
- Performing a cost / benefit analysis for each recycling and trash-handling program you use.
- Providing waste receptacles that are clearly marked to segregate recyclables (e.g. biodegradable materials and other waste).
- Using a pulper.
- Composting food waste.
- Partnering with others to use composted waste for landscaping or farming programs.
- Using reusable service ware (e.g. cups and glassware).
- Monitoring customer food waste to develop policies related to portion sizes and menu offerings.
- Using biodegradable disposable products.
- Donating reusables (e.g. leftover food, old uniforms, tablecloths, cloth napkins, and linens).
- Tracking usage of energy, gas, and water.
- Ensuring all food production and dishroom drains are routed

- through a grease trap.
- Developing solid waste reduction strategies.
- Using refillable containers for drinks.
- Operating a trayless dining service.
- Purchasing products with less packaging.
- Other:

**Question 3**

The following statements relate to sustainable waste management programs in your operation. For each statement, please rate your level of agreement, with 1 being **Strongly Disagree** and 5 being **Strongly Agree**.

1 - Strongly Disagree | 2 - Disagree | 3 - Neither Agree nor Disagree  
4 - Agree | 5 - Strongly Agree

	1	2	3	4	5
3.1 Implementing a sustainable waste management program will improve customer satisfaction.	<input type="checkbox"/>				
3.2 Implementing a sustainable waste management program will decrease food waste.	<input type="checkbox"/>				
3.3 Implementing a sustainable waste management program will be better for the environment.	<input type="checkbox"/>				
3.4 Implementing a sustainable waste management program will decrease costs.	<input type="checkbox"/>				
3.5 Implementing a sustainable waste management program will be good for the local community.	<input type="checkbox"/>				
3.6 Implementing a sustainable waste management program will be supported by our employees.	<input type="checkbox"/>				
3.7 Implementing a sustainable waste management program will give us a better reputation on campus.	<input type="checkbox"/>				
3.8 Implementing a sustainable waste management program will give us an advantage over our competition.	<input type="checkbox"/>				

**Question 4**

How important are the following when making a decision to implement a sustainable waste management program using a 5-point scale, with 1 being **Not Important** and 5 being **Very Important**?

1 - Not Important | 2 - - - | 3 - - - | 4 - - -  
5 - Very Important

	1	2	3	4	5
4.1 Maintain customer satisfaction	<input type="checkbox"/>				
4.2 Reducing food waste	<input type="checkbox"/>				
4.3 Protecting the environment	<input type="checkbox"/>				
4.4 Decreasing costs	<input type="checkbox"/>				
4.5 Benefiting the local community	<input type="checkbox"/>				
4.6 Increasing employee job satisfaction	<input type="checkbox"/>				
4.7 Improving reputation on campus	<input type="checkbox"/>				
4.8 Giving us a competitive advantage over our competition	<input type="checkbox"/>				

**Question 5**

How **LIKELY** would the following people support the implementation of a sustainable waste management program in your operation, with 1 being extremely unlikely and 5 being extremely likely?

**Please note: only see NOT APPLICABLE (Number 6) choice if it does not relate to your operation.**

1 - Extremely Unlikely | 2 - - - | 3 - - - | 4 - - -  
5 - Extremely Likely  
6 - Not Applicable

	1	2	3	4	5	6
5.1 Your superiors	<input type="checkbox"/>					
5.2 Your employees	<input type="checkbox"/>					
5.3 The students who dine in your facility	<input type="checkbox"/>					
5.4 University faculty and staff	<input type="checkbox"/>					
5.5 Vendor(s) / Supplier(s)	<input type="checkbox"/>					
5.6 College and university administration	<input type="checkbox"/>					

5.7 Other university foodservice operations	<input type="checkbox"/>					
5.8 The citizens of the local community	<input type="checkbox"/>					

**Question 6**

How likely would your sustainable waste management decision be influenced by the following people? Please rank on a 5 point scale, with 1 being **Extremely Unlikely** and 5 being **Extremely Likely**.

**Please note: only use NOT APPLICABLE (Number 6) choice if it does not relate to your operation.**

1 - Extremely Unlikely | 2 - - - | 3 - - - | 4 - - -  
 5 - Extremely Likely  
 6 - Not Applicable

	1	2	3	4	5	6
6.1 Your superiors	<input type="checkbox"/>					
6.2 Your employees	<input type="checkbox"/>					
6.3 The students who dine in your facility	<input type="checkbox"/>					
6.4 University faculty and staff	<input type="checkbox"/>					
6.5 Vendor(s) / Supplier(s)	<input type="checkbox"/>					
6.6 College and university administration	<input type="checkbox"/>					
6.7 Other university foodservice operations	<input type="checkbox"/>					
6.8 The citizens of the local community	<input type="checkbox"/>					

**Question 7**

The following items have been identified as barriers that prevent foodservice facilities from implementing sustainable waste management programs. Please indicate the extent to which you **AGREE** that the item makes sustainable waste management practices difficult. Please rate on a 5 point scale with 1 being strongly disagree and 5 being strongly agree.

1 - Strongly Disagree | 2 - Disagree  
 3 - Neither Agree nor Disagree | 4 - Agree | 5 - Strongly Agree

	1	2	3	4	5
--	---	---	---	---	---

7.1 Lack of information (training/education) about how to implement	<input type="checkbox"/>				
7.2 Lack of campus coordination	<input type="checkbox"/>				
7.3 Lack of financial resources	<input type="checkbox"/>				
7.4 Lack of ability to create lasting changes	<input type="checkbox"/>				
7.5 Lack of interest/willingness of employees to change	<input type="checkbox"/>				
7.6 Lack of tools and resources	<input type="checkbox"/>				
7.7 Lack of support from university administration	<input type="checkbox"/>				
7.8 Cost of recyclable, reusable products	<input type="checkbox"/>				
7.9 Lack of quality recyclable products available for purchase	<input type="checkbox"/>				
7.10 Overall cost of recycling	<input type="checkbox"/>				
7.11 Manager training time	<input type="checkbox"/>				
7.12 Time for managers to implement	<input type="checkbox"/>				
7.13 Required training time for employees	<input type="checkbox"/>				
7.14 Supervision required for employees to follow the tasks	<input type="checkbox"/>				
7.15 Lack of support by customers due to additional costs	<input type="checkbox"/>				
7.16 Lack of recycling facility and storage areas	<input type="checkbox"/>				

**Question 8**

In the future how likely are you planning to implement additional sustainable waste management practices in your foodservice facility using the scale 1 being **extremely unlikely** to 5 being **extremely likely**?

1 - Extremely Unlikely | 2 - - - | 3 - - - | 4 - - -  
5 - Extremely Likely

	1	2	3	4	5
8.1 Increase sustainable waste management practices in the future.	<input type="checkbox"/>				

8.2 Explore sustainable waste management programs.	<input type="checkbox"/>				
8.3 Continue developing environmental initiatives to reduce waste.	<input type="checkbox"/>				

**Question 9**

Status of your college / university:

- Private  Public

**Question 10**

Size of your school based on your foodservice budget (according to the NACUFS revenue designation):

- Small School (less than \$1M to \$8M)  
 Medium School (greater than \$8M to \$18M)  
 Large School (greater than \$18M)

**Question 11**

Management type of your foodservice dining facility:

- Self-operated  Contract managed

**Question 12**

What is the size of the community where your foodservice facility is located?

- A community of less than 50,000 people  
 A community between 50,000 - 100,000 people  
 A community greater than 100,000 people

**Question 13**

Do you have a campus wide sustainability workforce or committee?

- Yes  No

**Question 14**

Do you have a foodservice facility sustainability workforce or committee?

- Yes  No

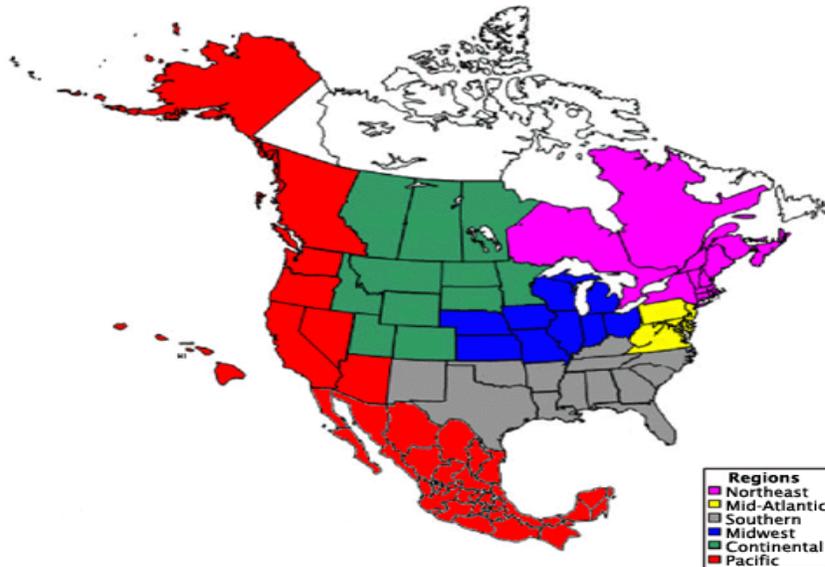
**Question 15**

What is your position at your foodservice facility?

- Director  Director  Other  
 Assistant  Manager

**Question 16**

Your geographic location:



- |                                      |                                       |                                   |
|--------------------------------------|---------------------------------------|-----------------------------------|
| <input type="checkbox"/> Continental | <input type="checkbox"/> Mid-Atlantic | <input type="checkbox"/> Pacific  |
| <input type="checkbox"/> Northeast   | <input type="checkbox"/> Midwest      | <input type="checkbox"/> Southern |

**Question 17**

Gender:

- |                               |                                 |
|-------------------------------|---------------------------------|
| <input type="checkbox"/> Male | <input type="checkbox"/> Female |
|-------------------------------|---------------------------------|

**Question 18**

How many years of industry working experience do you have?

- |                                     |                                      |   |
|-------------------------------------|--------------------------------------|---|
| <input type="checkbox"/> 0-5 years  | <input type="checkbox"/> 11-15 years | <input type="checkbox"/> 21 years or over |
| <input type="checkbox"/> 6-10 years | <input type="checkbox"/> 16-20 years |   |

**Question 19**

What is your level of education?

- |  |   |   |
|--|---|---|
| <input type="checkbox"/> High School / GED | <input type="checkbox"/> Associate Degree | <input type="checkbox"/> Advanced Degree Beyond College |
| <input type="checkbox"/> Some College      | <input type="checkbox"/> Bachelors        |   |

**Question 20**

What is your age?

- |                                       |                                |  |
|---------------------------------------|--------------------------------|--|
| <input type="checkbox"/> Less than 25 | <input type="checkbox"/> 36-45 | <input type="checkbox"/> Greater than 56 |
| <input type="checkbox"/> 26-35        | <input type="checkbox"/> 46-55 |  |

**Question 21**

What is your foodservice facility size based on number of meals served per lunch or dinner meal?

- Small-scale operation (0-99 servings)

- Medium-scale operation (100-499 servings)
- Large-scale operation (500-999 servings)
- Very large-scale operation (1000 or over)

## **Appendix E – Final Reminder**

**Reminder: COLLEGE AND UNIVERSITY DINING FACILITY  
FOODSERVICE DIRECTORS SUSTAINABLE WASTE MANAGEMENT  
SURVEY**

Dear Foodservice Directors,

This is a reminder that we would like for you to complete the College and University Foodservice Director Sustainable Waste Management Survey for Zoe Zhou's, Kansas State University student, Masters' Thesis research. If you have already done so, then please delete this e-mail. Your input is valuable to us and we appreciate your taking time from your busy schedule to take 10 minutes to complete the survey. The link below will take you to the survey website. This survey is available until March 22, 2010.

To participate in the survey, please follow the link below.

<https://surveys.ksu.edu/TS?offeringId=158868>

Zoe Zhou, Masters Student, Kansas State University  
Betsy Barrett, PhD, Associate Professor, Kansas State University

**If you have already completed the survey then please ignore this e-mail.  
THANK YOU for your time and participation!!**