

ELECTRONIC WASTE IN THE UNITED STATES:
USING Q METHODOLOGY TO ANALYZE
SUSTAINABLE ATTITUDES OF MILLENNIALS

By

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Abstract:

Using Q methodology (Brown, 1980; Stephenson, 1953; Watts & Stenner, 2012), this research study involved the collection of data from consumers age 18-25 years (Millennials) who have participated actively in the purchase of a cellular device, e-reader, game console, computer, or tablet in the past 12 months. A systematic study of subjectivity, Q methodology allows researchers to quantify qualitative statements such as viewpoints, opinions, and attitudes (van Exel, 2005). Because Millennials represent the largest group of technology consumers and disposers of small electronic waste in the world, it is important to understand the subjective preferences of this cohort in order to mitigate the growing electronic waste problem. Twenty participants sorted the 42 statements according to the condition of instruction “What are your thoughts about small electronic devices that you no longer use?” A conceptual framework was used to investigate Millennials perceptions regarding electronic waste that included six categories including personal connection/identity, monetary-related, knowledge base, security, social relevance, and convenience. Environmental narrative was used as the theoretical framework to guide data analysis and interpretation. Three viewpoints emerged: “Convenient Environmentalist” (Factor 1), “Gadget Guru” (Factor 2), and “Throwaways” (Factor 3). *Convenient Environmentalists* are concerned about the environment and will engage in sustainable behavior if it is convenient for them or they are incentivized. *Gadget Gurus* buy the latest technology and prefer to sell their old devices. They thrive on being validated and recognized for their behavior and want to be incentivized in order to act sustainably. *Throwaways* appear to be unaware about the effects of electronic waste and readily discard their devices. They are apathetic toward sustainable behavior and feel as though such activities do not make a difference. The three emerging viewpoints reflected several conclusions including social responsibility, validation and recognition, convenience, and incentive. Each of these conclusions is reflected differently in the three viewpoints making each distinct yet influenced by the generational characteristics referenced in the literature. Implications of these findings provides strong evidence for a systemic program to motivate and inform Millennials regarding electronic waste using positively-framed narratives from their peers and respected authority figures.

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CHAPTER I

INTRODUCTION

Researchers contend that the greatest cause of environmental pollution is directly attributable to human economic activities (Wiernik & Ones, 2014). In an era where products touting sustainable manufacturing, production, and packaging design are commonplace, a disconnection exists between ecologically-responsible products and the humans whose actions are contribute to this environmental wasteland. Consumer environmental marketing and education dates back to the 1960s, when the mantra *Do No Harm* preceded companies' desire to benefit financially. By the 1980s the popular environmental slogan was "Doing Well by Doing Good" (Fisher, Bashyal, & Bachman, 2012, p. 173). Finally, the term *green* became widespread in the 1990s, and the ever-popular movement to go green has been prevalent since the beginning of the 21st century (Fisher et al., 2012). Regardless of the bevy of marketing slogans aimed to generate awareness of environmental problems and promote sustainable behavior, there continues to be an unmanageable volume of solid and electronic waste generated by consumers. These waste streams contribute to diminishing landfill space and increase the amount of toxic waste released into the environment.

Background of the Study

The potential to recycle much of the waste is often lost, and raw materials are being buried and removed from the pool of resources available to future generations. One such solid waste stream, electronic waste, is the world's most rapidly expanding area of solid and hazardous waste (Miller & Spoolman, 2009; Toyasaki, Boyacı, & Verter, 2011; Widmer, Oswald-Krapf, Sinha-Khetriwal, Schnellmann, & Böni, 2005). Electronic waste (e-waste) includes smaller obsolete or broken electronic devices such as computer monitors, cellular phones, laptops, DVD and video equipment, tablets, game consoles, e-readers, and other small electronic devices (Bouvier & Wagner, 2011). E-waste represents approximately 2 percent of the solid waste stream in the United States and increased 52 percent by weight between 2000-2006 according to the United States Environmental Protection Agency (EPA) (Bouvier & Wagner, 2011). Additionally, the U.S. EPA has estimated that e-waste in Europe is growing at a rate of three times faster than all other municipal waste streams (Hanks, Odom, Roedl, & Blevis, 2008). In addition to the weight volume in municipal landfills, e-waste is especially concerning because electronic devices contain toxic elements such as lead, cadmium, mercury, and other poisonous chemicals (Hanks et al., 2008).

It is estimated that “90% of this [electronic] waste [that] is still landfilled or incinerated poses a health risk to society and environmental damage” (Toyaski et al., 2011, p. 805). Silveira and Chang (2010) indicated that a simple cellular phone can contain as many as 12 potentially toxic elements and that those hazardous elements represent about 35-40 percent of the device's total weight, including lead, arsenic, beryllium, cadmium, copper, nickel, and zinc (p. 2279). These elements are considered hazardous to human health and classified as persistent, bioaccumulative toxins (PBTs) that can contribute to a variety of health problems, including

cancer (Silveira & Chang, 2010).

At end of 2005, there were an estimated 55 million computers disposed in municipal landfills (Hanks et al., 2008). More significant is the potential amount of e-waste that has not yet been disposed of by consumers: “Another EPA report found that 75% of outdated electronic equipment was being stored rather than being thrown away or remanufactured” (Hanks et al., 2008, p. 334). Given the potential for this uncontrolled e-waste stream to make its way to municipal landfills where toxic, heavy metals can leach into groundwater, soils, and surface water, Silveira and Chang (2010) argued “the best management approach is recycling” (p. 2279).

Problem Statement

The rampant nature of the e-waste problem, combined with its far-reaching environmental impacts, has preempted a need for a global legislative response to instigate recycling of electronic components to reduce landfills and incineration, establish innovative design that discourages the use of hazardous materials, and prevent the unlawful and environmentally unjust action of outsourcing electronic recycling to third world countries (Toyasaki et al., 2011). “If we cannot rely on ever-increasing resource productivity and technological solutions to the problems of overconsumption and e-waste, we must then consider how to encourage individuals and society to consume in a more sustainable manner” (Wilhelm, 2012, p. 17). As a global epidemic, e-waste has incited a need for a greater understanding of how consumers dispose of electronic waste, recycle electronic waste, and how sustainable behavior may be influenced among consumers who are the earliest adopters of electronic devices, those individuals age 18-25 years, the Millennials.

Currently, there is little research available modeling the environmental consumerism of Millennials and subsequent efforts by these consumers to recycle e-waste. Wiernik and Ones

(2014) indicated the importance of understanding the role of demographics in environmental behaviors and “how various group characteristics, including ethnicity, gender, and age, might interact to influence environmental attitudes and behaviors” (p. 837). Schewe et al. (2014) noted that Millennials are important to understand because they are an important cohort for companies’ manufacturing and marketing consumer products. Despite their importance as consumers, research regarding Millennials as *ethical consumers* is limited; “Our lack of understanding might reflect their seemingly conflicting goals: At times, their principal concern is self-gratification, whereas at other points, it is social improvement” (Bucic, Harris, & Arli, 2012, p. 114).

In a 2010 study completed at Simon Fraser University, 36 students between the ages of 18 and 33 were surveyed. However, despite the assertion by researchers that the study was designed to learn more about the attitudes of millennial students, the three research questions focused on behavior of the participants: *What do you do with old electronics that you no longer use, such as televisions, microwaves, remote controls, electronic toys, wireless devices, iPods, digital cameras, game controllers and so on; Have you ever recycled old electronics; Do you want to recycle old electronics?* (Zhang & Wakkary, 2010, p. 1). Zhang and Wakkary asserted that most research studies regarding environmental recycling analyze either internal or external factors. Environmental attitudes, personal norms, habits, and demographics are considered a function of internal factors, while external factors that influence behavior include legal restrictions, monetary rewards, and other social influences. They refer to an important gap in the literature to understand e-waste recycling attitudes and behavior using qualitative research. The predominance of available research focuses solely on empirical surveys and quantitative analysis and does not significantly explore the relationships between internal and external factors

Purpose of the Study

It is important to understand the environmental perceptions and behaviors of Millennials because they are the *net generation*, a group of consumers “who have grown up with electronic goods, expecting and even demanding frequent technological improvements have the potential to generate an even greater amount of e-waste during their lifetimes” (Wilhelm, 2012, p. 17). This group’s early adoption and early disposal of electronic devices makes them an important cohort to both marketers and environmentalists alike. According to Nielson’s Fact Browser, 79 percent of U.S. millennial consumers aged 18-24 owned smartphones, representing greater percentage of ownership than any other age group (Nielson, 2013). Additionally, young adults aged 18-24 owned the most tablets and game consoles of all consumer groups. These millennial consumers are the largest group of influence purchasers and early adopters. In the 2012 Harris Poll of Green Consumer Spending, it was reported that 35 percent of consumers aged 18-24 were willing to pay a premium for products that are environmentally friendly. Examining the perceptions of electronic waste and sustainable attitudes of consumers aged 18-25 is key to establishing greater public recognition and mitigating the electronic waste problem. The purpose of this study the purpose of this study was to examine Millennials’ perceptions toward electronic waste and electronic recycling, and sustainable behaviors, as well as the potential activities that might influence or motivate sustainable behavior.

Research Questions

Engagement of millennial consumers is necessary to contextualize them as significant stakeholders and to distinguish between their goals and those of the scientific community. Using a collaborative methodology to understand the perceptions of sustainable behavior by millennial consumers, I sought to better understand the opinions of Millennials as primary consumers and

waste generators of small electronic devices using Q methodology with following research questions:

1. What are the perceptions of Millennials regarding electronic waste recycling?
2. What demographic descriptors help to understand perceptions regarding the recycling of discarded electronic devices?

Theoretical Framework

The concept of environmental narrative provides the theoretical framework for this study. William Cronon (1976) stated, “By writing stories about environmental change, we divide the causal relationships of an ecosystem with a rhetorical razor that define included and excluded, relevant and irrelevant empowered and disempowered” (p. 1349). An environmental narrative becomes a story by which the listener can attach a personal lens or frame of reference and recognize the imperative consequences of actions when they go unchecked in society. Cronon (1976) asserts that tales of environmental narrative change are most effective when they have can communicate a beginning and ending of the story: “What distinguishes stories from other forms of discourse is that they describe an action that begins, continues over a well-defined period of time, and finally draws to a definite close, with consequences that become meaningful because of their placement within the narrative” (p. 1367).

Kathleen Moore and Michael Nelson (2010) insist that information alone is not enough to establish a successful narrative; rather it is the absence of moral imperative that is the missing link to prompting positive, moral response to solving environmental issues. Similarly, in King (1999) asserts that it is important to include moral philosophy in narratives, but it is ultimately the responsibility of the *environmental philosopher* to determine whether narrative interpretations are part of an existing narrative or to establish a new narrative altogether. Such

narrative interpretations according to Cronon (1976) succeed to the level that the narrative “hides the discontinuities, ellipses, and contradictory experiences that would undermine the intended meaning of its story” making the “contingent seem determined and the artificial seem natural” (p. 1349).

Chapin (2010) suggests that scientists are inherently trained to avoid discourse that presents environmental issues in a deeply personal context, and it is the responsibility of the scientific community to establish narrative “that enable[s] society to see and hear more clearly the changes that are occurring, to feel deeply and personally their importance, and to recognize the connections between our personal and collective choices and the trajectory of life on this planet” (p. 75).

Narratives are a blend of past triumphs and failures and should prompt a positive feedback loop for the listener to explore a way to achieve the future that is desired (Cronon, 1976). However, many environmental storytellers and scientists construct a narrative whereby threats, catastrophe, and peril provide the moral framework (Brummett, 1991). Fear discourse interrupts the positive feedback loop and instill a sense that “certain events and experiences are inevitable, unalterable, and determined by external forces beyond human control” (Wojcik, 1996, p. 298) and the world is a “bankrupt society on the verge of imminent” ruin (p. 312). Foust and Murphy (2009) suggest that the tragic end of most environmental narrative leads people to believe “social order is beyond repair” (p. 154).

As so-called *moral agents*, it is important for environmental storytellers to have a critical understanding of the moral impetus of an issue and frame the narrative to be a positive reflection of a world worth salvaging. Cronon (1976) indicates that by acting as storytellers, environmentalists have the vital task of assigning judgment to human actions, but it is important

to discover our own dilemmas within the context of that moral judgment and try “to understand the choices that confronted the people whose lives we narrate so as to capture the full tumult of their world” (p. 1370). As a human way of organizing reality that is difficult to understand or particularly distressing, the narrative is critical to influencing environmental change. As it has been well stated by Chapin (2010), “the missing pieces are the dialogues necessary to connect the increasingly obvious planetary changes with the deepest motivations of every person as a steward of planet Earth” (p. 754).

A conceptual framework was used to develop the narrative and investigate Millennials perceptions regarding electronic waste included six categories: personal connection/identity concept, financial incentive, knowledge of environmental issues, security of data, social responsibility, and convenience.

The ages of Millennial college students make them *Digital Natives* who are highly technical, adaptive, and successful. The concept of personal connections was used to explore ideas about these individuals while enabling the participants the opportunity express their perceptions in a way that reveals characteristics of identity development.. Further, research suggest that Millennials are less likely to engage in interpersonal relationships in the physical sense because of their constant social connectedness through technology. As not only pioneers in adapting technology to their live, but as pioneers in consumption understanding the relationship Millennials have with their electronic devices is important to creating an appropriate dialogue for sustainable habits.

Another concept related to e-waste values and recycling is that of financial incentive. Having come of age in a period of economic recession, Millennials place value monetary incentive to elicit behavioral responses from everything to athletic performance, academic

achievements and social responsibilities. Additionally, monetary incentives appeal to Millennials' sense of recognition and need to be validated for doing a good job or acting in a socially appropriate manner. This concept was utilized because the researcher wanted to better understand what prompts these consumers to dispose or recycle and if monetary incentive is ultimately the most important criterion for deciding whether to engage in sustainable behaviors.

Another important concept relates to the level of knowledge that Millennials have regarding electronic waste, recycling and social responsibility. Research suggests that Millennials are well-informed regarding environmental issues, but that the value-action gap is wider for this generation than earlier generations. It is important to establish perceptions regarding recycling and its impact on the environment, but also in context with their personal values. As a highly educated cohort, Millennials have been exposed to environmental messaging for the entirety of their lives; however, research indicates that they lack follow-through when it comes to sustainable behaviors. This concept was important to enable participants to contextualize environmental-related attitudes based on their own values and perceptions.

Because popular media has instilled a sense of fear regarding personal security of data, particularly with regard to electronic devices, it is important to understand the role that security plays for younger consumers who are critical to recycling. Millennials have been imbued with sense of deep trust in organizations and authority. Through representing a smaller theme within the study, the researcher felt it was necessary to determine if fears regarding data compromise or if mistrust in authority figures who collect recycled electronic devices affects the attitudes toward proper disposal of their old devices.

Statements that were related to the theme of social relevance were used in the study in order to determine the level of Millennials' social awareness as related to electronic waste and to

better understand if those viewpoints had a direct impact on sustainable behaviors. Researchers have noted that Millennials are the most optimistic generation, able to see bigger pictures, value interdependence, and pursue global improvement, while remaining open-minded about societal change. Having a better understanding of how personal values related to social responsibility affects sustainable attitudes and ultimately facilitates action is important to e-waste recycling efforts.

Finally, the concept of convenience was considered for the study. Millennials are characterized as having a higher level of satisfaction with the government and their world and have a greater sense of closeness than other generations due to their constant digital connectedness; however, they exhibit a lack of follow through with sustainable behaviors. Some researchers contend that Millennials do not know how to adapt or change their behaviors to be more in line with their positive attitudes regarding environmental sustainability, so this theme represents an important category to better understand these consumers. The researcher wanted to understand if the lack of motivation to recycle or engage in environmentally-friendly behaviors was the result of convenience, understanding, or the absence of clearly structured recycling programs.

Scope of the Study

Using Q methodology as the research instrument, the purpose of this study was to understand the perceptions of Millennials as the largest group of early adopters of electronic equipment and the world's largest waste generators. By researching consumer perceptions of electronic waste and recycling, it is the aim of this dissertation to work toward a contribution in the field of environmental sustainability and public policy. Although the breadth of this topic lends itself to study a small portion of environmental consumerism and recycling as a whole, it is

my hope that I can continue to contribute meaningfully to work in this field by researching how appropriate messaging, education, incentives, and public policy can influence sustainable behavior.

The effectiveness of Q method has been examined by many researchers (Ellingsen, Størksen, & Stephens, 2010; Herrington & Coogan, 2011; McKeown & Thomas, 2013; Simons, 2013). In Q method, participants are presented with a set of statements called the P set, and asked to sort those statements according to how they fit into their beliefs and understandings resulting in the Q sort (Dziopa & Ahern, 2011). The individual Q sorts are compared to one another (Webler, Danielson, & Tuler, 2009) and factor analyzed for general patterns. This method has been shown to be especially effective in narrative research and therapy (Wallis, Burns, & Capdevila, 2013).

Definition of Terms

For the purposes of this study, the following terms are defined as follows:

Concourse: The basis for the Q set, the concourse represents the collective discourse from interviews, literature, and artifacts from which statements are extracted for a Q study (Brown, 1980).

Condition of instruction: The context by which the sorting takes place into levels of agreement (McKeown & Thomas, 1988, 2013).

Factors: A collection of interrelated subjective responses (McKeown & Thomas, 1988, 2013).

Non significant loading: Loading that is statistically insignificant on all factors.

P-set: Individuals selected to participate in a Q study to sort statements according to varying levels of agreement.

Q methodology: A research strategy used for the scientific study of subjectivity utilized through

“a distinctive set of psychometric and operational principles that, when conjoined with specialized statistical applications of correlational and factor analytical techniques, provides researchers a systematic and rigorously quantitative means for examining subjectivity” (McKeown & Thomas, 1988, p.7).

Q set: Statements derived and sampled from the concourse and given to participants to rank order in a Q study (McKeown & Thomas, 2013).

Q sort: The resulting structure of statements after the process of sorting Q statements about the concourse by the participant.

Chapter Summary

Although there has been some progress in awareness and activism, most people and companies are not doing much to limit their waste and consumption. The background of the problem showed that an area of particular concern is e-waste. E-waste includes smaller obsolete or broken electronic devices (Bouvier & Wagner, 2011). There is a real urgency to increasing awareness and garnering solutions to this problem, as even a cell phone can be dangerous when thrown away. Silveira and Chang (2010) indicate that a simple cellular phone can contain as many as 12 potentially toxic elements and that those hazardous elements represent about 35-40 percent of the device’s total weight, including lead, arsenic, beryllium, cadmium, copper, lead, nickel, and zinc.

There has been little research done into the environmental consumerism of Millennials and subsequent efforts by these consumers to recycle electronic waste. In addition, more focus must be given to the idea of the ethical consumer, especially in an examination of Millennials (Bucic et al., 2012), as studies indicated conflicting motivations in this demographic group. The problem statement discusses examining this group’s early adoption and quick disposal of

electronic devices, which makes them important to both marketers and environmentalists.

Examining their perceptions of electronic waste and sustainable attitudes is key to the study.

The research questions seek to understand the perceptions of Millennials as primary consumers and waste generators of small electronic devices using Q methodology. The scope of this study was to examine the perceptions of e-waste and electronic recycling of Millennials between the ages of 18-25. Finally, the theoretical framework shows the guiding philosophy used to facilitate construction of the discourse and the analysis of the resulting data.

CHAPTER II

REVIEW OF LITERATURE

In order to contextualize the research study, the purpose, and the outcomes, a literature review of broad attitudes toward environmentalism, as well as e-waste impacts, history, and practices is necessary. The literature review will review characteristics of Millennials and potential methods for influencing sustainable behavior.

The United States is the world leader in the generation of electronic waste, referred to as waste electrical and electronic equipment (WEEE), which includes items such as household appliances, both residential and commercial appliances that utilize refrigerants, small household appliances such as telephones, CRT devices such as televisions and monitors, and lighting equipment (Toyasaki et al., 2011). The U.S. EPA defines e-waste as waste that includes electronic and electrical devices that are no longer useful or wanted” (US EPA, 2008). It is estimated that more than 130 million computers, monitors and televisions are considered obsolete each year, with that number growing exponentially for all e-waste sources (Kiddee et al., 2013, p. 1237). Across the U.S., e-waste recovery occurs through residential curbside collection, drop-off events, permanent drop off at hazardous waste collection sites, manufacturer take-back, and point-of-sale collection, when it occurs at all (Jinhui et al., 2015, p. 7100).

Americans are considered to be worldwide leaders in what many consider a disposable society (Wilhelm, 2012). Wilhelm notes particular concerns with mobile phones where there are short technology cycles and even lower recycling rates (Wilhelm, 2012). These small electronics are responsible for 40 percent of the lead and 70 percent of other heavy metals leaching into U.S. landfills (Sachs, 2006). These heavy metals include some of the most dangerous contaminants to health and human safety including mercury, cadmium, hexavalent chromium, brominated flame-retardants, and beryllium (Sachs, 2006). “Other than pesticides and paints, electronics are likely the most hazardous products discarded by households in the industrialized world” (Sachs, 2006, p. 59).

Rampant consumerism in the U.S. where there is cell phone turnover every one to two years “has become the prime emblem of a throwaway society in the digital age” (Sachs, 2006, p. 60). Because of the universal accesses to new consumer electronics, e-waste is projected to have a growth rate of 4 percent each year (Milovantseva & Saphores, 2013). Despite the tremendous volume of e-waste generated in the United States, only about 10 percent of the electronic waste is recycled (Sachs, 2006). The primary disposal of electronic waste in the United States is landfills and incineration (Kang et al., 2005). Landfills, however, pose the threat of contaminating groundwater through leaching and do not represent a long-term solution to the e-waste issue (Kiddee, Naidu, & Wong, 2013).

Milovantseva and Saphores note that low recycling rates coupled with the costs of enforcing e-waste disposal ban, and the persistent struggle to engage consumers in recycling programs should prompt policy and programs to increase e-waste collection (2013). Engaging consumers is a significant issue because, they often store e-waste items (on average each U.S. household has at least four small and between two and three large items in storage), likely

because approximately 67 percent of people in the U.S. are unaware of e-waste disposal restrictions or policies, meaning that they are not likely to engage in ideal e-waste disposal practices (Ogunseitun, Schoenung, Saphores, & Shapiro, 2009, p. 670). This statistic indicates that beyond the potential impact of attitudes on e-waste practices, improved education measures are necessary for practical improvement. However, since attitudes are a complex topic for study and research regarding attitudes toward e-waste issues is limited, it is useful to review research regarding attitudes within the broader, yet related subject of environmentalism.

Attitude and Action in Environmentalism

Environmentalism originally emerged during the 19th century in response to exploitation of natural resources and evolved throughout the century to more broadly include environmental problems that emerged due to technology, issues that had delayed or complex environmental impacts, and issues that had consequences for both human health and well being and the environment. Throughout this period, the impetus to take action regarding the environment was increasing (Dunlap & Mertig, 2014). In general, the topic of environmentalism is too broad for effective review within this study. Instead, the relevant issue of attitudes toward the concept and the ways the movement as a concept evolved to compel behavioral change are significant when considering the potential for a similar phenomenon regarding e-waste.

Gifford and Sussman (2012) define environmental attitudes as concern for the environment or “caring about environmental issues” (p. 65). Attitudes toward environmentalism as a broader topic and the concern for translating values into action that accompanies environmental efforts mirror e-waste issues on a broader scale to some extent. Blake (1999) noted that there was an “explosion of interest in the social sciences in exploring the ‘everyday’ environmental values of different members of society, as both researchers and policy makers

have increasingly acknowledged the key role that individual people play in the quest for sustainability” (p. 264).

Gifford and Sussaman found that these fluctuations vary across age groups, genders, socio economic status groups, nations, and groups that reside in either urban or rural residences, as well as across political and religious groups (2012). Other values, as well as direct experiences with nature and education and environmental knowledge can also influence environmental attitudes. With these influences in mind, Sussman and Gifford (2012) note that media, messages, and environmental education may improve environmental attitudes.

Through their study on the relationships between incentives and opportunity structures, as well as attitudes and behavior, Best and Kneip (2011) found that “opportunity structures play an important role in predicting behavior, and relatively easy-to-implement policy measures, such as curbside recycling can further enhance environmentally responsible behavior” (p. 927). Their study revealed that “persons with more pronounced environmental attitudes tend to behave in a more environmentally friendly manner, and a corresponding increase in these attitudes increases the probability of recycling participation” (p. 927).

Bamberg (2003) offered yet another perspective, positing and empirically proving that weak relationships between environmental concerns and environmentally-related behavior exists because only situation-specific cognitions are direct determinants of specific behaviors. Bamberg clarified the connection, explaining that the relationship between the attitude of environmental concern and specific behaviors is an important, yet indirect one: “general attitudes should influence the perception and evaluation of the situation-specific behavioral, normative and control beliefs, which via their impact on attitude, subjective norm, and behavioral control

determine intention and behavior” (p. 23). In short, environmental attitudes indirectly influence situation-specific cognition, which in turn can influence behavior.

In order to understand how these elements of environmentalism relate to the more focused issue of e-waste recycling, it is important to fully understand the specific issue, its consequences, and historic, existing, and proposed methods for managing it.

E-Waste Recycling

Since the purpose of this study was to examine Millennials’ perceptions toward electronic waste and electronic recycling, and sustainable behaviors, as well as the potential activities that might influence or motivate sustainable behavior, it is important to fully review the reasons that e-waste is a significant issue, existing e-waste recycling practices, their impacts, and the factors that contribute to people’s participation in those programs.

E-waste as a Growing Concern

Martin and Harris (2014) posited that the rapidly growing e-waste issue has resulted from the technology industry’s rapid rate of innovation (and the short product life cycles before electronics become obsolete, which have resulted from the industry’s progress), as well as the convenience that online purchase and delivery methods have added to the purchasing process.

Kiddee, Naidu, and Wong (2013) noted that “smarter” designs and functions, as well as marketing and compatibility issues have contributed to the increasing rate of e-waste production.

Bhutta, Omar, and Xiaozhe (2011) not only note the significance of the rapid growth in e-waste production, but point out that many of these waste types contain “hazardous materials, such as lead, mercury, and cadmium, while nickel, beryllium and zinc can often be found in circuit boards,” (p.1) which contributes to the exigency of making substantial progress in resolving this issue. According to the Environmental Protection Agency’s (2011) report on

Electronics Waste management in the U.S., consumers only recycle one quarter of the 47.4 million computers, 27.2 million televisions, and 141 million mobile devices they dispose of annually. “High sales of electronics and rapid change in technology are major factors in the unprecedented volume of e-waste, and these products often are not even obsolete” (p. 17).

Even when consumers choose to recycle products, only 11 to 14 percent of e-waste at recycling centers is actually recycled, leaving the rest to be destroyed (Basel Action Network, 2013). In “Environmental Issues and Management Strategies for Waste Electronic and Electrical Equipment,” researchers challenge the concept that the toxic components used to produce electronic products are the primary reason that e-waste is a major global issue (Hidy, Alcorn, Clarke, Smith, & Thomas, 2011). Instead, they posit that the danger for human and environmental health lies in the gross mismanagement of these components’ disposal. Unfortunately, progress toward safe management of e-waste disposal has been slow and practices around the world remain imperfect. Kerns (2015) predicts that “without better government oversight and a heightened emphasis on collection and recycling—as well as better design engineering up front and recovery technologies after the fact—the problem of e-waste will only get worse” (p. 3).

Historic E-Waste Recycling Practices

Despite the fact that e-waste represents a relatively small fraction of the total amount of waste produced around the world, the dangers it poses and the rapidly increasing rate at which the population produces it make it an increasingly significant concern (Martin & Harris, 2014). Pickren (2014a) pointed out that “e-waste has a kind of dual character as both a resource and a hazard that make it a particularly unruly object of governance” (p. 113). As a resource, the valuable rare earth materials and precious metals contained within e-waste represent a resource

that needs effective reclaiming. However, in any case where the waste is improperly destroyed, its environmental effects can be devastating, and that effect intensifies in less developed and regulated countries, which have historically been dumping grounds for unwanted e-waste. Improper e-waste disposal can impact human health through toxic contamination from disposal and primitive recycling processes that result in by-products that enter the food chain and through direct exposure to workers in primitive recycling areas (Kiddee, Naidu, & Wong, 2013).

The practice of exporting e-waste to underdeveloped countries is a significant issue, because these destinations often lack the appropriate technology or regulations for safely disposing of the waste. Pickren (2014a) noted that although digital consumption is seemingly about the flow of information, rather than something taking place in a space, the result of a *smarter planet* is “grounded in geographically, socially, and ecologically uneven material processes” (p. 111).

Stone (2009) noted that e-waste is not a new issue. China, which began importing e-waste during the 1990s, has long grappled with the consequences of its disposal and has begun attempting to remedy the situation by banning e-waste imports and implementing governmental controls for its disposal. Man, Naidu, and Wong (2013) warn that e-waste flows have poured into developing or underdeveloped countries primarily because there are lower labor costs and fewer regulatory restrictions in those locations. “The people of poorer regions will be subjected to a life of poverty as well as being exposed to poisonous substances—health harming conditions that nobody should have to tolerate” (p. 1134).

In India, increased e-waste production has resulted in untrained workers treating and processing over 95 percent of e-waste in urban slums without protective equipment or effective training, because there is no large-scale organized e-waste recycling facility and there are only

two sectors for formally carrying out the e-waste recycling process (Annamalai, 2015). This arrangement poses significant hazards to the workers who lack adequate training or protection. Since the e-waste blends “plastics and chemicals, improper handling of e-waste is hurtful to the environment, as well as mankind” (p. 62). The workers in this country face innumerable health risks due to exposure to toxic heavy metals (Annamalai, 2015).

Other historically prevalent methods for destroying e-waste have included landfills and incineration. However, landfills present hazards such as leaking, leachate contaminating soil and groundwater, chemical reactions, vaporization, and uncontrolled fires. Incineration poses hazards such as dioxin formation, heavy metal contamination, health and safety issues, and contaminated slag, fly ash, and flue gases (Annamalai, 2015).

As conditions in China and India indicate, the effects of e-waste and its resultant issues reach beyond the environment and create political issues. Martin and Harris (2014) note that corporations who contribute to the growing e-waste issue create “global environmental issues, as well as geopolitical issues affecting trade policy concerning this waste” (p. 18). Pickren (2014b) noted that Northern consumption practices are linking with “livelihoods elsewhere, problematizing the devolution that places ‘citizen-consumers,’ NGOs, and corporate actors as key political agents of protecting workers and environments, promoting ‘ethical’ trade, and ‘greening’ economies through their purchasing choices” (p. 26). Furthermore, since e-waste is an issue that will only gain additional future visibility, legislation on the topic will increase, although it is not as of yet clear what direction that legislation will move toward (Martin & Harris, 2014).

Martin and Harris (2014) note that “E-waste, when disposed of improperly, is not only a physical danger to society but a possible personal privacy danger to individuals in ... in the

consuming countries” (p.18). Milovansteva and Saphores (2013) noted that the improper handling of e-waste has an economic impact, because it prevents the retrieval of valuable materials that are present in higher concentrations than available naturally. Although U.S. legislation has largely shielded companies from global e-waste legislation, Martin and Harris (2014) state that companies should begin developing e-waste programs now, accepting the inevitability of eventual legislation on this growing issue and capitalizing on consumer perceptions of their environmentally friendly actions.

Efforts to improve these practices have grown slowly in comparison to the rate at which e-waste production continues to increase. Bhutta, Omar, and Yang (2011) note that a major challenge for the advancement of e-waste recycling programs is the fact that the cost of recycling these products exceeds the revenue recovered through the process, especially when that process is well-regulated. The issue is further complicated because some components are not only hazardous, but an environmentally-friendly method for recycling simply does not exist yet.

E-Waste Improvement Efforts

The relatively ineffective programs previously in place for managing e-waste and the now undeniable effects they have had on the environment and human health have led numerous researchers and other stakeholders to develop and implement new programs. For example, Life Cycle Assessment involves improved product designs that minimize environmental impacts (Kiddee, Naidu, & Wong, 2013). Many manufacturers are making an effort to contribute to a reduction in e-waste by exchanging toxic components for “green” options.

At the government level, according to Martin and Harris (2014), numerous countries have adopted policies that place a portion of the e-waste recycling burden on the very manufacturers who create the problem. Some governing agencies, including the European Union, Japan, and

some states/provinces in the U.S. and Canada have established Extended Producer Responsibility (EPR) programs in which manufacturers are responsible for retrieving products after consumers have used them (Kiddee, Naidu, & Wong, 2013). An EPR fee holds electronics producers fiscally responsible for “the collection, treatment, recovery, and environmentally sound disposal of electronic goods” (Fehm, 2011, p. 175).

Fehm (2011) suggests that this arrangement could resolve the issue of funding for improved recycling practices. The researchers take the concept a step further positing that companies could leverage their role in the end of life stages for products for profits by transforming the waste into raw materials and enhance their corporate appeal to conscientious consumers. Leigh, Choi, and Hoelzel (2012) pointed out that “a potential advantage of EPR policy is that it creates an incentive for OEMs to manufacture their products to a specification that reduces the difficulties and costs of disassembling and managing e-waste” (p. 941). Renckens (2008) held that the U.S. employed more of an extended “product” responsibility approach, rather than a purely extended producer responsibility approach. “Extended product responsibility was defined as a principle under which ‘manufacturers, suppliers, users, and disposers of products share responsibility for the environmental effects of products and waste streams” (p. 287).

One of the most impactful efforts on an international scale has been The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (known as the Basel Convention), which was adopted in 1989 and set into action in 1992. The Basal Convention entered the spotlight at the United Nations following revelations during the 1980s regarding toxic waste disposal in Africa (Basel Convention, n.d. a). The convention defines e-waste as “electrical and electronic equipment when becoming waste (e-

waste) such as personal computers, televisions, mobile phones, refrigerators, and air conditioning units” and classifies it as hazardous waste because it contains “toxic materials such as mercury, lead, and brominated flame retardants,” as well as both precious and heavy metals (Basel Convention, n.d. a).

The convention’s enactment had three major goals. First, it sought to effectively implement participating parties’ obligations regarding the transboundary movements of hazardous and other wastes and to effectively identify which items would receive classifications as wastes and non-wastes (Basel Convention, n.d. b). Secondly, it sought to strengthen the environmentally sound management of hazardous and other wastes. Finally, it sought to promote “the implementation of environmentally-sound management of hazardous and other wastes as an essential contribution to the attainment of sustainable livelihood, the Millennium Development Goals, and the protection of human health and the environment” (Basel Convention, n.d. b).

The Basel Convention’s goals seek to accomplish a variety of objectives, including common definitions for the types of waste that the convention covers, the prevention of illegal traffic in hazardous and other wastes, and improved development and communication of data regarding waste generation, exports, and imports (Basel Convention, n.d. b). They attempt to prevent and minimize hazardous waste and its impacts, while supporting and promoting capacities for parties to effectively manage hazardous and other wastes through improvements in technological capabilities (Basel Convention, n.d. b). Additionally, the convention intends to “enhance and promote the sustainable use of resources by improving the management of hazardous and other wastes” (Basel Convention, n.d. b).

Many nations have signed and ratified the Basel Convention; however, the U.S. has not yet ratified the convention, meaning that it does not enforce or enjoy the benefits of the

conventions stipulation (Jinhui et al., 2015). Olds (2012) stated that there is no national legislation that specifically addresses e-waste and that the Resource Conservation and Recovery Act (RCRA), which designates the EPA as the regulator of hazardous waste, does not include the vast majority of e-waste in its definition, including residential disposal of electronic waste. That legislation has only a limited impact because households and businesses that do not exceed hazardous waste limits are exempt from the regulations. The enactment of the regulation, in which businesses seeking to export CRTs must report to the EPA, but receive less stringent regulation if they export for reuse, rather than recycling, further limits its efficacy. Olds (2012) notes that this model incentivizes companies to export items for reuse that may not actually be reusable.

The EPA has developed some volunteer programs that both incentivize manufacturers and recyclers to adhere to higher waste management standards, and that encourage individuals to return used electronic devices to certified partners, who appropriately dispose of them (Olds, 2012). “The voluntary approach has become the main channel to deal with e-waste at the federal level” (Renckens, 2008, p. 291). Other non-government programs include the e-Stewards Initiative, which is a non-profit organization based in the U.S. that enables those who wish to recycle their e-waste to easily find recyclers and holds the recyclers it associates with to high standards levels (Olds, 2012).

In the U.S. the government has established the Federal Acquisition Regulation, which directs federal agencies to purchase environmentally friendly goods and services (Fehm, 2011). However, according to Hidy et al. (2011), the U.S. contrasts with other countries in that policies regarding e-waste recycling and disposal have primarily originated under state and local control and lack overall cohesive unity. The number of state initiatives focused on the e-waste issue is

due, in part, to the federal government's lack of cohesive policies and decision not to ratify the Basel Convention (Jinhui et al., 2015). Such disorganization makes an assessment of individual state practices, where information is available, essential to understanding existing e-waste recycling practices.

In Florida, efforts toward effective e-waste recycling and disposal methods have been at play since 1988 (Hidy, Alcorn, Clarke, Smith & Thomas, 2011). Florida regulates corporations and manufacturers by focusing on e-waste disposed of by entities that are not private citizens as sources of hazardous waste (leaving those entities with the burden to prove that their waste is not hazardous). The state government has established widely utilized voluntary certification programs for electronics recyclers and state contracts to recycle unwanted electronics from state government agencies, local governments, and school boards.

Other states have passed additional legislation. In California, the state legislature passed the Cell Phone Recycling Act with positive results. Milovansteva and Saphores (2013) found that the act "had a significant and positive impact on the recycling rates of cell phones" (p. 15) likely contributing to the state's 27 percent recycling rate for cell phones in 2009. However, the researchers found that e-waste disposal bans for junk TVs in 12 other states were mostly ineffective due to poor publicity and enforcement.

This lack of unity across states makes it more difficult to accurately develop a specified definition of WEEE within the U.S. The disparities between state programs have made even the widely adopted variants of the Extended Producer Responsibility (EPR) programs less effective (Hidy et al., 2011). According to Olds (2012) the disorganization among state policies is an issue because it creates a compliance burden that forces manufacturers to navigate widely varying regulations, where even similar policies may vary in their definitions of e-waste for

manufacturers. This complication then increases the cost for proper domestic e-waste recycling. Olds (2012) further notes that in the case of e-waste exports, states are not capable of directly addressing the issue because it is an international trade issue that the federal government should address.

Factors for Improving E-Waste Recycling

Several factors contribute to the lack of e-recycling in the U.S. beyond those that are regulatory related. Until such time as the U.S. government elects to implement a mandatory take-back program through EPR, design innovation techniques, or some other legislation, voluntary programs can work to achieve public support and awareness of the e-waste problem. Public recognition of the predicament as well as the subsequent understanding and support of recycling of electronic waste is critical to mitigating the problem (Kang & Schoenung, 2005).

Despite government and nongovernment efforts in developing e-waste policy and solution, Jinhui et al. (2015) note that consumers “are vitally key actors in the e-waste recycling chain because they choose the disposal channels and destinations for their household e-waste” (p. 7097). Most consumers in the U.S. are unaware that electronic products have no economic value at their end-of-life and, such products should be recycled as soon as possible in order for manufacturers and recyclers to salvage any components for future usage (Kang & Schoenung, 2005). Additionally, it is estimated that more than 70 percent of consumer electronics are stored for as much as five years rather than discarded and recycled immediately (Kang & Schoenung, 2005). In a study conducted by Saphores et al., it was estimated that an average of 4 small and 2.4 large e-waste devices are being stored rather than discarded or recycled by consumers (Saphores, et al., 2009). Consumers tend to store their used electronics before discarding them, which is a behavior influenced by consumers’ traits and lifestyles, technology evolution, product

design features, product market value, and pro-environmental stimuli (Sabbaghi, Esmaeilian, Raihanian Mashhadi, Behdad, & Cade, 2015). These researchers have concluded that “the backlog of e-waste in the US is likely larger than generally believed; it calls for developing the recycling infrastructure but also for targeted recycling campaigns” (Saphores, et al., 2009, p. 3322).

Bouvier and Wagner’s study investigated the collection rate of e-waste, specifically computer monitors and televisions, in Maine. Their results suggested that the rate of collection might be increased if recycled fees were lowered or eliminated, and the convenience of collection was increased (Bouvier & Wagner, 2011). Saphores et al. concluded that convenience of e-waste collection, a promotion of moral norms and implementing a public education program will increase recycling e-waste (Saphores, et al., 2012).

With so many factors influencing e-waste recycling program success, many researchers have determined that successful programs will eventually need to meet a diverse set of needs. Jinhui, Xianlai, Mengjun, Ogunseitan, and Stevels (2015) stated that manufacturer efforts toward supporting improved e-waste disposal practices, including reducing use of toxic materials and improving product design for easier disassembly and resource recover, are essential because formal recycling programs vary so greatly around the world.

According to Kiddee, Naidu, and Wong (2013), the ideal solution will be a combination of approaches, including “develop eco-designed devices, properly collect e-waste, recover and recycle material by save methods, forbid the transfer of used electronic devices to developing countries, and to raise awareness of the impact of e-waste pollution of both users and manufacturers” (p. 1246). However, Millennials, as one of the largest consumer groups for electronics in the U.S. will likely have a major impact on how the government creates effective

e-waste programs, which is why this study focused on attitudes and perceptions in this arena. In order to effectively study the role that this generation will play in e-waste practices, it is important to develop a deeper understanding of their perceptions.

Millennials

Millennials, or individuals born between 1981-1999, represent approximately 76-80 million people in the United States. This group is second only to baby boomers whose population is approximately 80 million (Embree, 2003, Schewe et al., 2013). This group has been referred to by many different names including “Echo Boom,” “Gen Y,” “Baby Busters,” “Gen Next”, “Digital Natives”, and the “Plastic Generation.” Lancaster and Stillman (2002) note that Millennials have had access to digital technology such as cell phones since birth.

According to Greenblatt (2015), Millennials’ behaviors and thoughts have a profound impact on American society and have contributed to reshaping the ways that Americans shop, consume news, and communicate with each other. Millennials themselves have been profoundly affected by the 2007 – 2009 economic recession and the high levels of student debt they carry. Their worldview is relatively optimistic when compared to earlier generations, and their cultural diversity is the highest of any generation yet, all of which impact the unique ways that Millennials approach the world.

Millennials’ influence on societal consumerism, coupled with the fact that e-waste is a growing portion of all waste generated by consumers, inextricably elevates their consumer behaviors and environmental attitudes as significant components of the e-waste issue. Understanding their worldviews and various characteristics, such as summaries of the demographics including education, workplace presence, and relationship with technology, is important to determining factors that might influence sustainable behaviors by this group.

Millennials differ from earlier generations in their demographic composition (they are the most diverse generation), as well as their choices for when to marry, make major purchases, and start families (Greenblatt, 2015). They have emerged as the most culturally diverse generation, due in part to an influx in immigration that began in the 1940s, resulting in 15 percent of the generation hailing from a foreign country (The Council of Economic Advisers, 2014).

Millennials are characterized as highly technical, adaptive, ambitious, and confident (Schewe, 2013). In general, they have a higher level of satisfaction with the government and their world, feeling a sense of closeness due to their constant connectedness; “Generally, they think they’ll be Okay” (McNall & Basile, 2013, p. 300). Significantly, many researchers have noted that they are the most optimistic generation, despite employment challenges, high levels of student debt, and the fact that many entered the workforce during an economic recession (Greenblatt, 2015). However, Hershatter and Epstein (2010) noted that Millennials’ belief systems and values are not necessarily different from earlier generations; they are not necessarily more altruistic, family-oriented, or motivated to succeed than earlier generations.

Millennials and Education

Hershatter and Epstein (2010) noted that from their outset, Millennials have been sheltered and protected because they were born into a world where educational shortcomings were receiving national attention, and federal agencies were beginning to regulate everything from cars to products to ensure their safety. All of these precautions have combined to imbue the generation with a deep trust in organizations and a “strong preference for structures and systems that support them” (Hershatter & Epstein, 2010, p. 215).

DeBard (2004) noted that educating Millennials at the collegiate level requires consideration of their overall increased levels of cultural diversity and specific traits that are

prevalent among them, including that they are (or view themselves as) special, sheltered, confident, conventional, team-oriented, and pressured. Indeed, these traits, as well as the generation's experiences within schools and institutions, have combined to create a pressure-packed group of individuals, driven toward success.

“They have been pushed by their Boomer parents to be the best they can be in order to help demonstrate how good Baby Boom parenting has been,” (Debard, 2004, p. 38). DeBard added that the Millennial drive to perform drives other characteristics of the generation, such as their need for clarity. Millennials seek clear structure because they feel that their compliance to that structure will result in achievement.

According to the Council of Economic Advisers (2014), more Millennials have a college degree than any other generation and are more likely to attend graduate school, likely in response to economic conditions that have delivered increasing returns on higher education investments. However, Millennials do not simply want to go to college, they “are anxious to attend the most prestigious school to which they are admitted because they see a strong correlation between the status of the school from which they graduate and the best job opportunities” (Hershatter & Epstein, 2010, p. 216).

Perhaps the most significant characteristic of Millennials' educations is the cost. According to the Council of Economic Advisors, “Total student outstanding loan debt surpassed \$1 trillion by the end of the second quarter of 2014,” (2014, p. 16). This debt incurred in the pursuit of a higher education, which is producing a diminishing return, often influences Millennial behavior beyond educational settings as they move into the world as young adults and professionals.

Millennials and the Workplace

According to Ferri-Reed (2013), Millennials began entering the workforce at a less than ideal time—just after the U.S. economy faced its biggest setbacks since The Great Depression of the 1930s. Millennials faced the additional difficulty of graduating with more student loan debt than the generations that preceded them, causing many individuals to move back into their parental homes to cut costs (Greenblatt, 2015). Millennials remain optimistic about the future, with 80 percent reporting that they were optimistic about their standard of living improving (Ferri-Reed, 2013).

Ferri-Reed (2013) characterized Millennials as able to see bigger pictures, value interdependence, pursue global improvement, remain open to change and new societal trends, and to harness the power of technology. With these advantages on their side, Millennials' optimistic views spread into their expectations for their work. They demand good pay and benefits, rapid advancement, work/life balance, interesting and challenging work, and work that contributes to society. Their expectations for pay and benefits, which some view as inflated and unrealistic, may reflect their need for feedback or the sense of entitlement that persists amongst these individuals (Ng, Schweitzer, & Lyons, 2010). These expectations have significant consequences for employers because “when they do not see the quick rewards at one firm, Millennials will move to an employer that provides greater opportunities” (p. 282) even though they insist on putting forth relatively little effort to earn rewards (Ng, Schweitzer, & Lyons, 2010).

Beyond advancement and payment expectations, Millennials are challenging their employers to be more socially responsible as they seek work that is meaningful and fulfilling and assess companies' missions and values before deciding which ones they want to work for (Ng,

Schweitzer, & Lyons, 2010). Millennials had positive experiences within organizations and institutions during their school years, and these formative experiences have changed the way they interact with them. They tend to expect more explicit instruction and a more caring and secure environment (Hershatter & Epstein, 2010).

The unique demands that this generation brings to employers has led to a growing body of research advising corporations on methods for engaging and retaining this demographic. Ferri-Reed (2010) recommended five strategies for engaging this generation: implement strong onboarding practices that fully introduce Millennials to the company and how their role contributes to the bigger picture; create a workplace that is dynamic, interesting, challenging, and fun; offer them challenges and provide positive feedback and encouragement where possible; balance critical feedback with praise when coaching them to improve; and clearly delineate the career path potential within your team.

Millennials and Technology

Millennials represent the most digitally-connected cohort in the U.S. where 75 percent utilize social networking as compared to 50 percent of Generation X and 30 percent of Baby Boomers (Schewe et al., 2013). According to the Council of Economic Advisers (2014), Millennials are “more connected to technology than previous generations and a quarter of Millennials believe that their relationship to technology is what makes their generation unique” (p. 7). Hershatter and Epstein (2010) stated that “their relationship with technology has changed the way they know the world” (p. 21). In comparison with earlier generations, according to Greenblatt (2015a), some Millennials meet their social needs online and they are less likely to connect through traditional means, practice religion, marry, or affiliate with a political party. According to Lenhart, Purcell, Smith, and Zickuhr (2010) 93 percent of Millennials use the

internet, and 72 percent use social networks, and increasing numbers have multiple social network profiles.

Considered some of the earliest and fastest adopters of new technologies, Millennials own multiple small electronic devices such as smartphones, tablets, and gaming consoles making them particularly important to the conversation of electronic waste recycling (Barton, Fromm, & Egan, 2012). In fact, Millennials outpace other generations in technology ownership, with 95 percent of adults under the age of 34 owning cell phones (Mulvihill, 2011). According to Mulvihill (2011), Millennials were not only the most likely to own the most gadgets, they also ‘took advantage of a wider range of functions’ on these gadgets”. According to Aquino (2012), Millennials are the first generation “to grow up with the internet and mobile devices,” and “to consider behaviors like tweeting and texting, along with using Facebook, Google, Wikipedia, and YouTube, not as novel ideas, but as normal aspects of their social lives” (p. 22). This generation’s connection to these social elements is omnipresent, with 58 percent (aged 23 to 31) owning a smartphone, and 70 percent accessing mobile internet at least monthly (Aquino, 2012). Significantly, the Council of Economic Advisers (2014) noted that the dramatically decreased costs of creating and distributing all types of content in this increasingly digital environment has allowed Millennials to become more than pioneers in production or technology, they are pioneers in consumption.

Millennials as Consumers

Gaudelli (2009) indicates that Millennials, as a highly-educated cohort, represent some of the most knowledgeable consumers regarding the importance of environmental issues affecting the world. However, Millennials’ consumer patterns were greatly impacted by the economic

recession of 2007 – 2009, and as the economy recovered their spending patterns evolved (Greenblatt, 2015a).

As employment rates for young adults increased, car purchases by Millennials increased by 118 percent between 2010 and 2014, which is more than double the increase for Generation X (Greenblatt, 2015a). Many members of this generation are reaching the life stage where they are having families and moving to suburbs. Though Millennial spending habits are evolving, their experiences with the recession and student debt have made them more careful spenders. They not only seek the best prices, but they leverage technology to gather information about the products and prices available to them, which makes them more susceptible to purchasing based on peer reviews rather than advertising (Greenblatt, 2015a). According to Aquino (2012), Millennials are more aware of marketing ploys than earlier generations, which contributes to their preference for purchasing based on peer opinions rather than advertising.

These consumer behaviors and the purchases that result ultimately contribute to the waste stream. Despite the fact that many believe that Millennials are the most environmentally-friendly generation and are more likely than earlier generations to believe that climate change is occurring, surveys have indicated that their behavior does not necessarily change as a result (Greenblatt, 2015b). Millennials, however, do not consider themselves less concerned with the environment, even though they shy away from the term “environmentalist.” Polls have revealed that this generation is 30 percent more likely to favor developing alternative energy sources (Benderev, 2014). For Millennials, environmental issues and their actions to support their awareness of those issues have developed a complex relationship.

In the study conducted by Hanks et al., Millennials were found to be more likely to purchase a used vehicle than a used laptop, suggesting that this group of consumers considers

mechanical products to be longer lasting than digital technologies such as mobile phones or computers (Hanks, et al. 2008). These researchers noted that even those Millennials with a higher level of awareness did not exhibit more sustainable purchasing behaviors nor did these more-informed Millennials dispose or recycle electronic waste in more sustainable ways (Hanks, et al. 2008). Hanks et al. noted “end of service choices that keep an item in use were not a common response...[and] 52.8 percent of participants indicated they simply store old cell phones away” (Hanks, et al. 2008, p. 338). The researchers concluded that even with Millennials who exhibit a high level of awareness or motivation, follow-through of recycling or disposing of electronic devices in a sustainable way is low (Hanks, et al. 2008).

Research completed by Smith (2010) indicates that Millennials are fickle regarding their purchase of green products. Millennial consumers are more likely to purchase products “that practice minimalism, meaning that they use clean designs, packaging, and advertising; this translates to environmentally friendly, even if the companies are not actually doing much to benefit the environment” (p. 442). Further, Smith indicates that millennial consumers are more likely to purchase environmentally-friendly products for food but not clothing or technology products. Biology professor Richard Niesenbaum said, 85-90 percent of Millennials are "open to protecting the environment and natural resources, but not leaders and not interested in being seriously inconvenienced or paying a cost to do so" (AP, 2012, np).

The disconnect between Millennials’ environmental concerns and their actions is consistent with similar findings and patterns discussed earlier regarding attitudes toward environmentalism as a whole. In defense of the attitudes, Henrich (2008) indicated that these young consumers understand the importance of acting in an ecologically relevant and sustainable manner but do not have an understanding of how to adjust their behaviors. Boston Consulting

Group (Barton, Fromm, & Egan, 2012) refers to Millennials as exhibiting the behavior of “slacktivism” (p. 7) to describe how their desires to support socially relevant of environmentally-oriented causes only if there is little personal effort required.

Although consumerism as a whole is contributing to the e-waste issue, the concept of political consumerism indicates that it may ultimately be part of the e-waste solution, especially for Millennials who are one of the largest consumers of electronics. Newman and Bartels (2011) define political consumerism as “the intentional buying or abstention from buying specific products for political, social, or ethical purposes” (p. 810). However, it is important to consider that “increases in education, interest in politics, and citizen duty each increase the probability of engaging in political consumerism” (p. 810) when considering whether this concept applies to Millennials, who may have higher educational levels than earlier generations, but also have less political interest. Although studies have shown that green purchasing is inconsistent among Millennials, other indicators for political consumerism, including youth and political distrust, indicate that the concept could possibly gain ground.

Weirnik and Ones (2014) suggest that this generation may perceive themselves as having a greater amount of time to prepare and engage in future-oriented goals related to sustainability. “We may expect younger individuals to show more concern for the detrimental effects of their environmental actions for their own futures, as they are likely to suffer from negative consequences of unsustainable economic activities for a longer period of time” (p. 828). Research published by the Boston Consulting Group (Barton, Fromm, & Egan, 2012) indicates Millennials believe that they can improve the world through their actions; they are much more inclined to persuade others to participate, believing that collective action is necessary for change. Regardless of the reasons why Millennials do not actively engage in sustainable activities such as

e-waste recycling, researchers agree that it can be difficult to isolate those motivators that will encourage ethical consumption (Bucic, et al., 2012).

Influencing Sustainable Purchase Behavior

Since consumption of electronic products is a major driving factor behind the growing e-waste issue, the sustainable purchasing behaviors that consumption entails and methods for influencing them require consideration. Paavola (2001) provides a simple and concise definition of sustainable consumption on which to base this discussion, defining it as “consumption that entails reduced adverse environmental impacts” (p. 228).

Some initiatives toward sustainable consumption have targeted the general population with the expectation that they “become aware of their share of responsibility in the pressures exerted on natural resources and environments, and thus of the need to adapt their consumption habits in order to improve the situation” (Rumpala, 2011, p. 669). Other initiatives have leveraged education as a key tool for communicating sustainable consumption imperatives. Paavola (2001) investigated strategies for influencing these sustainable consumer behaviors and found that, while universally shared, nonutilitarian environmental concerns (where the cost of pro-environment actions was not taken into account) would be effective if they were possible, collective action through regulations that are uniformly applied are an optimal option.

Sustainable consumption, and subsequently purchasing behavior, is an important issue because “as everyday behaviors are repeated, they exert significant, cumulative impact on medical, social, and economic outcomes experienced by both individual consumers and society as a whole” (Verplanken & Wood, 2006, p. 90). Since informational strategies for changing consumer behaviors are relatively ineffective, the population’s existing habits must factor into efforts to change purchasing behaviors.

Researchers at San Diego State University found that 30 percent of baby-boomers felt it was important to personally be involved with environmental cleanup programs as compared to the 21 percent of Millennials who responded the same (AP, 2012). This is consistent with the literature that suggests recycling and tendency toward sustainable behaviors is “higher among more affluent and older people, but lower among less affluent and younger households” (Martin et al., 2005, p. 357). Weirnik and Ones (2014) suggest that Generation X and Baby Boomers may have a greater tendency toward sustainable behavior due to the cultural and social encouragement they experienced during the 1960s and 1970s as a response to rising energy costs and the subsequent public campaigns for consumers to reduce, reuse, and recycle. Weirnik and Ones (2014) suggest that the decades of consumption that occurred during the 1980’s and 1990’s resulted in “pro-environmental messages were less common in the media and in schools” causing later generations to become less concerned with sustainable behaviors (p. 845).

Fisher et al., cited two studies where age has a significant effect on the potential for consumers to exhibit ecologically conscious consumer behavior (ECCB) where mature consumers were more likely to be more environmentally minded in purchase decisions (2012). As noted by Weirnik and Ones (2014), “A natural extension of investigating demographic trends in psychology is the investigation of age-effects in environmental sustainability variables” (p. 827). They maintain that studies should examine the relationship between age and environmental sustainability to better understand how to achieve environmental goals.

Carrigan, Moraes, and Leek (2011) held that socially-responsible organizations could positively impact consumer behaviors and attitudes, enhancing a sense of social responsibility and ethical consumption by pursuing initiatives that embody those beliefs.

The researchers hold that entities can influence consumer habits through downstream

interventions, which they define as those “that provide informational inputs at points when habits are vulnerable to change” (p. 516). They believed that entities could change habits through “upstream” interventions, which “take place before habit performance, and disrupt old environmental cues” (p. 516).

Increasing global awareness of local and global environmental issues has resulted in positive responses to products marketed as being green, or environmentally-friendly (Hahnel et al., 2015). However, Mark Potosnak, an environmental science professor at DePaul University in Chicago, indicates that Millennials may be less receptive to messaging regarding environmental problems because they are desensitized, having been exposed to such debates for their entire lifetime: "It's like poverty in a foreign country. You see the picture so many times, you become inured to it" (AP, 2012). Similarly, McNall and Basile (2013) assert that Millennials tend to be skeptical and need messages framed in a positive way that corresponds with their value systems in order to elicit a response. If environmental labels are vital to persuade sustainable behavior of Millennials as D'Souza suggests (2004), then those should not only be specific, but the narrative surrounding the claims should be meaningful to the consumer (Ottman, Stafford, & Hartman, 2006).

It is important to note, however, that the “green” movement may be significantly flawed, since increased sales incentivize producers to market unsustainable products as environmentally-friendly. According to Hahnel et al. (2015), “Product labels may facilitate shallow processing of information that primarily relies on superficial cues rather than on detailed solution” (p. 2).

Because Millennials are so highly-connected to information and social communication, they are highly-persuaded by the opinions of their peers and fellow consumers (Smith, 2012, p. 89). As Smith contends, “Millennials, like market mavens, are eager to share their expertise and

opinions with other consumers” (p. 86). McNall and Basile (2013) discuss the “new narrative” whereby Millennials need to be told how their actions can make a difference for themselves and future generations. Millennials should be educated using information framed in such a way that ensures they have the right information to make informed decisions (Orr, 1994). These researchers maintain that infusing education messaging with a positive narrative that offers millennial consumers a sense of empowerment is paramount to achieving environmental goals. “The story people are buying into must establish a clear link between the actions people can take and the goals to be achieved. No, this will not be easy, but it is possible” (McNall & Basile, 2013, p. 301).

Chapter Summary

This literature review has revealed numerous sources to contextualize this study’s endeavor to investigate Millennials’ attitudes about e-waste practices and issues. Broader understandings of attitudes toward the topic of environmentalism provide a potential lens for viewing e-waste specific attitudes, while a deep understanding of e-waste, including the history, impacts, and current practices surrounding the issue, ensure a rich understanding of the topic itself. The study’s particular focus on Millennials, due to their leadership in digital and electronics consumption, called for a careful discussion of this generation of digital natives, as well as means for influencing sustainable purchasing behaviors.

CHAPTER III

METHODOLOGY

The purpose of this study focused on investigating the perceptions of Millennials, as the largest group of early adopters of electronic equipment and their subsequent attitudes on recycling discarded devices. This chapter began with a background on Q methodology, followed by the rationale for using Q methodology as the research approach, an explanation of the site and sample selection, and provided a summary of each phase of the investigation. The study design and data analysis was used to investigate the following research questions:

1. What are the perceptions of Millennials regarding electronic waste recycling?
2. What demographic descriptors help to understand perceptions regarding the recycling of discarded electronic devices?

Q Methodology

First developed in 1935 by physicist-psychologist William Stephenson, Q methodology allows researchers to examine subjective viewpoints, opinions, beliefs, and attitudes of individuals beyond what is gleaned from traditional data collection methods, such as surveys (Brown, 1993). Initially, Q methodology was applied to research in the field of psychology. Q methodology has also been applied to environmental resource management, sustainability, and

environmental policy (Clarke, 2002; Maguire & Steelman 1999; Webler & Tuler, 2001). Both Sweden (2006) and Addams (2000) described the benefits of employing Q methodology to provide solutions to contentious environmental issues. A systematic study of subjectivity, Q methodology (Q method) allows researchers to quantify qualitative statements, such as viewpoints, opinions, and attitudes (van Exel, 2005). McKeown and Thomas (1988) commented that subjectivity consists of a person's point of view on an issue, stating,

Fundamentally, Q methodology entails a method for the scientific study of human subjectivity. Subjectivity, in the lexicon of Q methodology, represents a person's communication of his or her point of view. As such, subjectivity is always anchored in self-reference but this does not render it inaccessible to rigorous examination. (p. 12)

In Q method, participants are presented with a set of statements called the Q set, and asked to sort those statements according to how they fit into their beliefs and understandings resulting in a rank ordering or Q sort. The researcher compares the individual Q sorts for saliency against one another (Webler, 2009). When the researcher identifies patterns between Q sorts the patterns denote shared beliefs among people; thus, leading to the idea of social perspectives (Webler, 2009).

Q methodology "is an exploratory, interpretation- intensive methodology suitable for small populations of respondents" (Davis & Michelle, 2011, p. 561), and credibility is found through factor analysis of the self referent Q sorts. Q method allows insight into audience subjectivities in a much richer and more holistic way than conventional surveys, while providing clearer structure, a more rigorous analytical framework than purely qualitative approaches such as individual interviews, focus groups, or ethnographic observations.

Additionally, Q method has the potential to increase the relevance of qualitative investigations, inform surveys, and compliment textual analysis (Davis & Michelle, 2011). Q

method as a research methodology is a type of discourse analysis technique used to analyze a type of text to establish patterns and meanings (Webler, 2009). However, as Webler (2009) pointed out, the advantage that Q method had over other discourse analysis techniques resides in how participant's responses compare in a consistent manner, since each participant was sorting the same set of statements.

Q methodology is intended for smaller sample research studies, where the researcher analyzes the opinions of a limited number of participants who are both diverse and well informed of the issues presented, rather than a large sample population (van Excel & de Graf, 2005). Q sorts are established through discourse with stakeholder participants, unlike traditional quantitative methodologies that rely on a predetermined set of questions generated by the researcher (Brown, 1993). Participants are presented with statements that pertain to a topic, referred to as the Q set, that have been derived or sampled from a concourse of all possible subjective statements related to the topic of study. Once the statements are gathered from interviews, literature, relevant documents, or other sources, then participants arrange and rank each subjective, representative statements in comparison to one another, considering the context of all the statements in the Q set (Webler et al. 2001). Q sorting enables participants to divulge their subjective viewpoints by assigning personal values to each of the statements provided (Smith, 2001). Finally, Q methodology is used to generate a factor analysis using correlations of significant clusters of sorters' opinions that can be quantified into themes.

Appropriateness of Q Methodology

Because there remains little research regarding the study of Millennials and electronic waste recycling, it became important to pursue a study that adhered to the principle of exploratory research. For example, Lincoln and Guba (1985) indicate that social phenomena

should be conducted with a minimal of priori expectations, and such expectations should emerge through the process of research itself. Lacking a priori hypothesis, where no presumptive analysis was undertaken, inductive reasoning enables significant ideas to emerge from the data. Further, Stake (1995) supported this exploratory process by saying, “We may have reservations about some things the people tell us, just as they will question some of the things we will tell about them. However, we enter the scene with a sincere interest in learning how they function in their ordinary pursuits and situations and with a willingness to put aside many presumptions while we learn” (p. 1).

Recognizing that research in the field of environmental science relies heavily on quantitative methodology, I reviewed the literature for emerging sources of qualitative research to support the use of Q methodology as an exploratory tool. According to Ashley and Boyd (2006), qualitative enquiry is particularly relevant to environmental studies because of the complexity of the relationships between humans and the environment and subsequently the perceptions of those individuals. Further, Williams (2000) suggests adding the human element to scientific research, because it is the nature of science to be a social practice involving checks and balances in heterogeneous research environments.

While environmental, technical, and scientific research has traditionally been subject to quantitative data generation and analysis, Q methodology enables the researcher to contextualize qualitative data in a quantitative way. Due to the exploratory nature of the study, Q methodology remains ideally suited to discovering perceptions, examining subjectivity of a limited sample of participants, and understanding attitudes across a smaller, target population. Q methodology offers a unique method approach to revealing an individual’s perceptions, values, and attitudes.

Given the target population for this research, having a research methodology that appealed to a Millennial student's inherent desire to feel important and be recognized for their individual contributions yielded more successful results than a traditional R study. Additionally, the research that I undertook consisted of an exploratory nature, lending itself to the parameters of Q method. Although it can not be used to test a hypothesis, Q method remains valuable to study environmental literacy because Q method has proven to be a successful methodology where the research questions had socially contested answers (Davis, 2011). Webler (2009) indicates that Q method remains a strong methodology for researchers in environmental studies because of the ability to "reveal different social perspectives that exist on an issue or topic" (p. 6).

Q Method Versus R Method

The Q methodology approach to research can be distinguished from traditional methods through stable holistic viewpoints across a population considered consistent and measurable. Unlike Q studies, R studies use measurements by traits and do not take individuals' viewpoints into consideration (McKeown & Thomas, 2013). R studies generalize the population as a whole; however, Q studies analyze the viewpoints of a group of participants and are then used to generalize characteristics to the resulting phenomena.

Differing from R analysis, the subjects of a Q study are the statements in a Q set and the variables are the Q sorts of the participants (Webler, 2009). This remains a simple, but key distinction. In an R study, a sample of survey responses should be representative of the entire population (Webler, 2009). In Q method, the researcher intends the participant sorts to be representative of the beliefs of a target population (Webler, 2009). Differing from a survey, Q participants were chosen for this study because they were well informed about a particular

subject, making the Q sort easier for them and the results more robust (Webler, 2009). The researcher designs survey questions in an R study enabling respondents to interpret each statement in the same way (Webler, 2009). With a Q study, participants interpret statements differently, and the statements are interpreted within the context of one another (Webler, 2009).

In this Q study, the Q set was used to measure participants' viewpoints and to generate "factors of subjectivity directly from the population rather than a priori measures determined by researchers" (Robbins, 2005, p. 211). Q studies and R studies should not be considered approaches that are either contradictory or independent research strategies. The exploratory nature of a Q study used to determine subjectivity of a group of participants might be subsequently followed up using an R study to understand better the population as a whole.

Validity (Credibility)

Brown (1980) described validity in Q methodology, as "Quite obviously, the notion of validity has no place since there is no external criterion for a person's own point of view" (p. 191). However, to build upon the criterion of validity in research, I fully disclosed the potential biases and limitations of the study and outlined steps to protect the research and data. Further, I utilized an external auditor, a dissertation committee, chair, research advisor, and an outside professor with expertise in the area of Q methodology.

Role of the Researcher

Human participants were asked to answer questions about their attitudes and perceptions toward electronic waste and recycling; later, individuals were asked to sort cards about their beliefs. Because the research project used humans as participants, I outlined number of steps I followed to ensure that the research participants were protected below:

- The study was submitted to the Institutional Review Board at Oklahoma State University, and approval was granted before any research was conducted.
- At any time during an interview or Q-sort session, participants were allowed to withdraw from the study without penalty. No participants elected to withdraw from the study.
- All data was coded to protect privacy of the participants.
- All data was kept on a password-protected computer, which only I have access.
- The data were backed up on a cloud storage device, which only I have the password to access the information.
- All printed materials, such as copies of interviews and Q sorts, will be kept for a minimum of time during the dissertation process and subsequently destroyed.

Assumptions

Assumptions in this study included:

1. Q method was determined as the best research methodology for the exploratory nature of this study and was used to explore the subjectivity of Millennials as large-scale adopters and waste generators of small electronic devices.
2. Stimulus statements were obtained from prior research within the available literature, as well as from a sampling of informal interviews. These sources represented an appropriate and accurate Q-set for this study.
3. Participants in the study were assured anonymity to support them responding in an honest and reliable fashion.

Study Procedures

Sustainable attitudes of Millennial consumers were analyzed to determine what mediums,

messaging, or education can influence sustainable behaviors, such as electronic waste recycling. The study was completed using five steps. The first step involved the development of the concourse, which can come from all relevant discourse, such as interviews, participant observations, popular media, or academic literature (van Exel, 2005). For this study, the literature and interviews were used to construct the concourse. The second step involved the development of the Q set, which consisted of sampled statements from the concourse and 42 statements were sampled from a concourse of 200+ statements. I carefully selected statements for sorting that were widely different from one another to make the Q set as representative as possible. Different researchers will have diverging Q-sets from the same concourse (van Exel, 2005). The third step involved sorting statements by participants. Finally, analysis and interpretation of Q sorts occurred (van Exel, 2005). In the analysis phase, I used a software program, PQMethod, to correlate all sorts among participants and provide data comparisons for patterns within the resulting theoretical sorts.

The Concourse and Q Set

To develop the concourse, I interviewed five students or recent graduates at Oklahoma State University. The development of the concourse remained critical to the study. van Exel and de Graaf (2005) indicate, “The gathered material represents existing opinions and arguments, things lay people, politicians, representative organizations, professionals, scientists have to say about the topic; this is the raw material for a Q” (p. 4). I contacted students contacted via telephone and in-person to complete the initial interviews. A set of sample questions were asked enabling the respondent to answer without constraints providing open-ended responses, which was required to generate a concourse of statement from which to sample to get the Q set. This was because Q methodology relied on the subjective opinions and perceptions of participants;

whereby, “the respondent [was able] to describe what is meaningful and salient without being pigeon holed into standardized categories” (Patton, 1987, p. 15).

A concourse represents all possible opinions about the topic of study in this case electronic waste (Brown, 1980). In order to provide richness in the results, the concourse should reflect a broad spectrum of opinions regarding the subject (McKeown & Thomas, 1988). The concourse derived from a variety of sources, including magazines, journals, books, newspapers, images, cartoons, and pictures (Brown, 2006; McKeown & Thomas, 1988). In this study, I developed the concourse using a naturalistic approach; whereby, interviews with a sample population, knowledgeable on the subject, was conducted to collect statements about their attitudes toward electronic waste and e-waste recycling. This approach offered additional reliability, “Usually the statements are taken from interviews, hence are grounded in concrete existence” (Brown, 1996, p. 562).

A conceptual framework was used to sample the concourse in order to select statements for the Q set a range of statements was chosen to create a Q set that represented the full range of statements in the concourse (van Exel & de Graaf, 2005). From the initial interviews, I identified several clusters of statements that were used in conjunction with the literature to for the concourse. The conceptual framework that was used to develop the narrative and investigate Millennials perceptions regarding electronic waste included six categories including personal connection/identity, monetary-related, knowledge base, security, social relevance, and convenience.

Participants were asked to sort the following 42 statements that were developed using the following themes: personal connection/identity, monetary/incentive, knowledge base, security, social relevance and convenience. The statements used for the Q set can be found in

Appendix C. To coordinate the sorting procedure, a researcher's script was read to participants following the condition of instruction: "What are your thoughts about small electronic devices you no longer use?" I presented the participants with an uncategorized group of 42 statements with a number on each representing the Q set. They were asked to read through the statements and to sort them into three piles according to statements that were most like themselves and statements that were most dislike themselves. Any statements that could not be easily categorized in one group or another were considered neutral statements and placed in a middle pile. Participants were then asked to rank order the statements on the Q sort array form according to the condition of instruction. Participants were forced to compare each and every statement and assign value to the statements depending on where they were placed on the Q sort array. Participants were then asked to continue filling in the cells until each of the statements was represented on the form of 11 columns. The number of cells stacked in each column was 2, 3, 4, 5, 6, 8, 6, 5, 4, 3 and 2 across the continuum, having a value range of 1 (most dislike) to 11 (most like). This numbering was for the convenience of the sorter and unrelated to the statistical value of -5 to +5.

After participants completed the sorting procedure, I taped the statement numbers directly on the array form, which represented the raw data to be analyzed. Data collection lasted between 10 to 15 minutes. Once the Q sort was completed, participants were asked to fill out a demographic questionnaire (Appendix B) with information on gender, age range, socio-economic status, education, and small electronic devices owned/purchased. Additionally, participants were asked if they were willing to volunteer to be contacted by phone for a possible follow-up interview following the sorting procedure. These interviews were completed after data analysis and initial interpretation of results. Three informal phone interviews were

conducted to provide the researcher with an opportunity to check with exemplars of the factor group to further understand initial interpretations about the data (Watts & Stenner, 2012).

Institutional Review Board Approval

This study and its procedures were reviewed by the Institutional Review Board (IRB) at Oklahoma State University (OSU) related to the use of human participants. Approval was gained from the IRB before data collection began. A copy of the approval letter is provided in Appendix A.

The P-Set: Participants

Purposeful sampling was used for the research whereby research participants, known as the P set in Q methodology, were selected according to the needs of the study. The selection criteria included consumers who were 18-25 years old having minimum criteria of technology usage and technology ownership, regardless of whether the media consisted of computers, gaming consoles, cellular devices, MP3 players, or other relevant, small electronic devices. Larger electronic devices were not considered in the course of this study since they have a longer life-to-disposal period than the aforementioned smaller devices. Q methodology often necessitates choosing participants based on their familiarity and knowledge of the topic to offer the potential for a diversity of opinions (Brown, 1980). With a purposeful sampling method, I invited a few individuals who yielded information and informed opinions on the research questions. While the sample might not represent the population statistically, it provided data about the target population. For this study, two sets of participants were required: 1) participants whose interview responses were used to develop the concourse and 2) participants (P set) who sorted the statements.

All forms of information solicitation with participants were completed in a professional, consistent manner to reduce bias as much as possible and to guarantee the validity of the data. The Q sorts were conducted over a one-month period in July 2015. Following their agreement to participate in either the initial interview or the Q sort, participants were asked to sign a Letter of Informed Consent. Reciprocity in exchange for time given to the in-depth interview was offered to participants in the form of a \$5 Starbucks gift card.

For this study, university undergraduate and graduate students between the ages of 18-25 were selected to participate. Five participants were interviewed to construct the concourse along with information from available and relevant literature. Twenty participants provided the Q sorts. Purposive and snowball sampling was used to recruit university student and to ensure the diversity of their perceptions toward electronic waste recycling. In a Q study, a smaller number of participants is considered appropriate as there are typically fewer than seven factors that emerge from the data (Brown, 2002). The unknown number of factors can lead to the researcher *oversampling* and a larger number of participants is required to have significant loads on each factor. However, Brown indicates that a larger number of participants is “counter productive” because large numbers of Q sorts (greater than 40) will mask interesting themes (Brown, 2002).

The research site included two, four-year college campuses, Oklahoma State University in Stillwater, Oklahoma and Oral Roberts University in Tulsa, Oklahoma providing opportunities to identify students from both a public and private university. These two universities were chosen due to the proximity to the researcher and the vast availability of qualified participants who were between the ages of 18-25 and who currently own small, electronic devices.

Demographic data, including gender, age and other relevant characteristics are presented in Table 1. All of the participants own and/or have purchased/disposed of a small electronic

device within the past 12 months. The Q sort included 10 females and 10 males. Additionally, half of the participants identified as being undergraduate students and the other half as graduate students.

Table 1

Participant Demographic Data

ID	Gender	Age	Socio-Economic Status	How is college funded?	Area of Study	Highest Level of Education	Degree Pursuing
1	Female	23	Higher Middle	Family Assistance	Marketing	Bachelor's Degree	Graduate
2	Female	23	Lower Middle	Scholarship/Grant, Family Assistance	Marketing and Human Resource Management	Bachelor's Degree	Graduate
3	Female	24	Higher Middle	Scholarship/Grant, Family Assistance, Loans	Psychology/ MBA	Bachelor's Degree	Graduate
4	Female	23	Higher Middle	Scholarship/Grant, Family Assistance, Loans	Journalism	Bachelor's Degree	Graduate
5	Female	23	Higher Middle	Family Assistance	Elementary Education	Bachelor's Degree	Graduate
6	Female	23	Lower Middle	Scholarship Grant & Student Loans	Psychology	Bachelor's Degree	Graduate
6	Female	18	Higher Middle	Scholarship/Grant, Family Assistance	Integrated Marketing Communications	Current Student	Bachelor
7	Female	25	Middle	Scholarship/Grant, Family Assistance, Loans	Ed Psych	Advanced Degree	Graduate
8	Female	23	Higher Middle	Family Assistance	Marketing	Bachelor's Degree	Graduate
9	Male	20	Higher Middle	Scholarship/Grant, Family Assistance, Loans	Business Management	Current Student	Bachelor
10	Male	24	Higher Middle	Family Assistance	Marketing	Current Student	Bachelor
11	Male	21	Middle	Scholarship/Grant, Family Assistance, Loans	International Community Development	Current Student	Bachelor
12	Male	19	Higher Middle	Family Assistance	Media and Public Relations	Current Student	Bachelor
13	Male	24	Middle	Scholarship Grant & Student Loans	Drama and Film	Current Student	Bachelor
14	Male	21	Middle	Scholarship/Grant	Journalism	Current Student	Bachelor
15	Male	21	Very Poor	Family Assistance	Engineering	Current Student	Bachelor
16	Male	19	Higher Middle	Scholarship/Grant, Family Assistance, Loans	Sports Management	Current Student	Bachelor

17	Male	22	Middle	Scholarship Grant & Student Loans	Communications	Bachelor's Degree	Graduate Degree
18	Male	25	Middle	N/A	Ag Education	Advanced Degree	Graduate Degree
19	Female	25	Lower Middle	Scholarship Grant & Student Loans	Marketing	Current Student	Bachelor
20	Male					Bachelor's Degree	Graduate Degree

Chapter Summary

In this chapter, I summarized Q methodology and outlined the study methods I used, including building the concourse, developing the Q set, and facilitating the sorting. In Chapter 4, the analysis that lead to the results of the study are discussed, along with the interpretation of the factors that represent the findings. The results of this study might influence policy makers, environmentalists, educators, and manufacturers in establishing effective methods of communication for influencing sustainable behavior, such as recycling, among Millennials.

CHAPTER IV

FINDINGS

This research was conducted to examine Millennials' attitudes with regard to discarding or recycling small electronic devices. To pursue this objective, the study used the following research questions to provide a better understanding of the participants' points of view regarding this issue.

1. What are the perceptions of Millennials regarding electronic waste recycling?
2. What demographic descriptors help to understand perceptions regarding the recycling of discarded electronic devices?

Because Millennials 18-25 represent the largest group of technology consumers and disposers of small electronic waste in the world, it is important to understand the subjective preferences of this cohort in order to mitigate the growing electronic waste problem. In order to do so, I have utilized Q methodology in this study using a series of statements that were sorted according condition of instruction: "What are your thoughts about small electronic devices you no longer use?"

Analysis of the Data

The analyses of the data from this study explore the participant's subjectivity by having them sort statements related to personal connection and identity, financial gain or loss,

knowledge of e-waste, security, social relevance, and the convenience of recycling. All the sorts are considered equally rather than a dependence on statistical dominance with research instruments such as surveys. Therefore, each of the participants had equal opportunity to define and cluster into any of the emerging factors. “The number of factors is therefore purely empirical and wholly dependent on how the Q sorters actually performed” (Brown, 1993, p. 15).

Data were entered into PQMethod 2.35 software available free for download at <http://schmolck.userweb.mwn.de/qmethod/>. Analysis of the data is interpreted holistically by factor allowing the researcher to understand the relationships between the individual sorts and the emergent factors (Watts & Stenner, 2005; 2012). Until the data were analyzed, I did not have any preconceptions regarding the number of factors or the generalizations to my topic of study that would emerge.

PQMethod software determines how groups of Q sorts correlate with one another resulting in distinct factors. Principal Component Analysis (PCA) is utilized to retain as much of the original data while reducing the data to a convenient size and correlating the Q sorts (McKeown & Thomas, 1988). PCA is used to determine the least number of factors accounting for the common variance of a set of variables. In Q method, individual sorts are correlated rather than the statements being sorted. Therefore, the characteristics of the factors is dependent on the participants performing the Q sort (Brown, 1980).

The final statistical stage of Q method, data analysis, is the calculation of corresponding factor scores (z-scores) allowing the ranking of the statements within the factor to be interpreted as a viewpoint or type of thinking. Factor analysis allows the researcher to statistically interpret data by indicating clusters of participants using their Q sorts.

Once the 20 Q sorts were entered into the PQMethod software, eight factors were initially

extracted in the unrotated factor matrix, though only six of the factors had an eigenvalue greater than 1.00 and were considered potentially viable for further examination. PQMethod software restricts the number of factors to a maximum of eight owing to the assumption that more the eight possibilities for diverging interpretations of statements are unlikely. Although the analysis program I used will extract as many as eight factors, examination of the factor analytic solutions typically yield only three to five factors that have value and warrant further consideration by the researcher.

A varimax rotation was utilized to decrease the number of factors and increase the reliability of the resulting factors. Varimax rotation aligns factors in an orthogonal fashion with perpendicular axis enabling the participants' sorts to load high and low on differing factors while reducing correlation between each factors (Robbins, 2005). Because of the number of high significant loadings on the first factor and subsequent confounded sorts (those sorts that achieve significance on more than one factor), a matrix of three factors was chosen. Then, the sorts that best define the factor were flagged (with an X in Table 2) and used to generate the z-scores for that factor.

Using the 0.45 significance level, 15 of 20 sorts loaded significantly on one of the three factors. Two sorts were nonsignificant on any of the three factors, meaning that the participant did not achieve a significance of 0.45 on any of the three factor viewpoints, and three sorts were confounded by significant loading on multiple factors indicating that those participants held viewpoints consistent with more than one factor. Table 2 displays how the participants' sorts loaded on the three factors with demographic information including gender, age and income level.

Table 2

Factor Matrix with an X Indicating a Defining Sort Loadings						
Sort #	Gender	Age	Socio-Economic Status	Factor 1	Factor 2	Factor 3
8**	Female	25	Middle	0.6942X	0.448	0.139
12	Male	21	Middle	0.6839X	0.2206	-0.3505
15	Male	21	Middle	0.6388X	0.1167	0.2855
3	Female	24	Higher Middle	0.6139X	0.0291	0.1702
11	Male	24	Higher Middle	0.6054X	0.0576	0.1354
18	Male	22	Middle	0.6047X	0.3587	0.1874
6	Female	23	Lower Middle	0.5554X	0.0162	0.034
1**	Female	23	Higher Middle	0.1301	0.7149X	0.228
4	Female	23	Higher Middle	0.2323	0.6962X	-0.0857
14	Male	24	Middle	-0.0597	0.6792X	0.2452
7	Female	18	Higher Middle	0.3295	0.6044X	0.0091
5	Female	23	Higher Middle	-0.0833	0.5416X	-0.2098
19	Male	25	Middle	0.1035	-0.0749	0.6669X
16**	Male	21	Very Poor	0.3624	0.2421	0.5832X
2	Female	23	Lower Middle	0.0649	0.4045	0.4710X
20	Female	25	Lower Middle	0.5703	-0.0671	0.5319
10	Male	20	Higher Middle	0.267	0.3689	0.2048
13	Male	19	Higher Middle	0.4126	0.1202	0.0984
17	Male	19	Higher Middle	0.5129	0.6164	-0.0489
9	Female	23	Higher Middle	0.5098	0.4679	-0.3599
% Explained Variance				21	17	10
Number of Defining Sorts				7	5	3

Note: Sorts used to define the factor loadings in bold (>0.45).
 ** Denotes exemplar sorters.

To determine significance, the following formula was used. The standard error of a zero-order correlation coefficient (factor loading), where, $SE = 1/\text{SQRT}(N)$, with N representing the number of Q sort statements and SQRT the square root function. The Q sort of this study contains 42 statements, $SE = 1/\text{SQSORT}(42) = 1/6.48 = 0.1543$. Under the normal curve,

loadings in excess of $2.58(SE) = 2.58 (0.1543) = .3981$ or 0.40. Then significance level was increased to 0.45 to maximize differences among the three factors. Those values that are considered statistically significant (greater than or equal to >0.45) have been flagged in order to identify the sorts that best define the distinct view of the factor. Those participants who did not have a significant load on any one factor are considered confounded sorts and are not included in the factor z -scores (Schmolck, 1998).

Factor analysis of Q sorts represent clusters of sorts by participants and allows the researcher to interpret the data in a way that lends itself to rich descriptions and themes. Factor arrays, according to Brown, represent the overall points of view and the entire response pattern (Brown, 2002). For factor interpretation, statements were viewed as an array with the most positive (+5, +4) and most negative (-5, -4) array scores identified first. Then the statements that distinguish the one factor more than the others are used in interpretation. Furthermore, other comparisons of statements across factors and the demographics and descriptions of the individuals whose sorts define the factor are helpful. One exemplar was chosen for each factor to provide interview data to further the validity of the interpretation. The exemplars were chosen because they define the factor well with a high significant load on one factor more than the other factors.

Distinguishing statements are those statements that are statistically different between any two factors (Brown, 2002). When factors are highly correlated there will be fewer distinguishing statements; therefore, Brown (2002) indicates that it is more favorable when factors are not highly correlated with one another. Factors were not highly correlated, thus establishing data with higher reliability. The standard errors for differences in factor z -scores are $r_{1,2} = 0.296$, $r_{1,3} = 0.342$, and $r_{2,3} = 0.353$. The number of distinguishing statements is dependent on how many of

the statements receive dissimilar scores from those scores for the statement in other emerging factors (Brown, 1997). While the highest and lowest z -scores are critical to understanding and interpreting factors, distinguishing statements are important by offering the researcher insight on how each factor differs from the others.

The z -scores represent a statement's position on the factor array and describe the standard deviation above or below normal distribution. For this study, the z -scores were recorded on an array from -5 to +5. A score of +5 indicates that the participant is "most like" the statement when contextualizing it with their thoughts on small electronic devices they no longer use. Conversely, an array score of -5 represents an attitude of being "most unlike" the participants. For score interpretation, those scores with the highest (+5, +4, +3) and lowest (-5, -4, -3) scores were further analyzed to yield insight into the emerging theme for the factor. Interviews of the exemplars (larger significant loading on one factor over the other two factors) were conducted to assist in the clarity of the factor viewpoint.

As suggested by Cahnmann (2003) poetic analysis or narratives based on the interpretive data were written for each viewpoint (factor). In using narratives to represent each of the three viewpoints, "researchers can enhance their abilities to listen and notice the field during data collection, creatively play with metaphor and image during analysis, and communicate with more liveliness and accuracy when representing data to larger audiences (p. 32). Additionally, Butler (1988) indicated that poetic or narrative analysis enables the researcher to express more fully the emotion behind relationships or cultural discourse that has been uncovered during data collection. Kitzinger (1999) stated that the advantages of Q method are the opportunities to focus on the subjective experiences and the beliefs that emerge from the participants' sorts, whereby, the focus becomes "eliciting and describing a wide diversity of different subjective experiences,

perspectives, and beliefs, none of which are defined a priori by the researcher” (p. 269). The fictional narratives that are used to describe each of the viewpoints are based on the participants who had sorts defining high on the related factor as well as data from the demographic survey and post-sort interviews.

Research Question 1

The first research question in this study was: What are the perceptions of Millennials regarding electronic waste recycling? The data analysis revealed the three aforementioned factors representing distinct viewpoints among the participants. Following are descriptions of the three viewpoints and the subsequent themes that emerged guiding interpretation.

Factor 1: *Convenient Environmentalist*

Convenient Environmentalists had the largest number of sorters with seven participants loading significantly on this first factor (Table 2). Additionally, 21 percent of the total variance was explained by the *Convenient Environmentalist* viewpoint. Of the seven sorts that defined this perception, three were females and four were males. Four participants indicated that they came middle income families, three indicated they were from higher middle income families and one indicated their family was lower middle income. Four students indicated that they are pursuing graduate degrees, while the other three indicated that they are undergraduate students. It is worth noting that all the females who had sorts loading significantly for *Convenient Environmentalist* indicated that they are graduate students.

Because participants with this view believe in recycling and recognize the importance of it to protect the environment demonstrating a high capacity for social responsibility; however, they believe that recycling programs should be convenient in order to be successful. This consumer has an awareness of how their electronic waste is affecting the environment but also

wants to be incentivized or encouraged to recycle in some way. The top nine “most like” and “most unlike” statements are provided in Table 3. Those statements that have been identified as distinguishing have been denoted with an asterisk. Regardless of whether a z-score is high or low, a statement may be considered distinguishing if it is statistically different when compared to how the statement loaded for other two viewpoints.

Table 3

Factor 1: *Convenient Environmentalist*

Statement No.	Most Like Statements	z-Score	Array Position
42	I feel like recycling should be advertised and managed by schools or local governments.	1.78**	5
26	Recycling helps our climate problems.	1.72	5
28	Recycling preserves our resources and protects wildlife.	1.6**	4
37	I think it is important to keep old devices in case I need them later on.	1.49**	4
21	I am not really sure what to do with my old devices.	1.38	4
10	I feel like I should be able to trade in old devices for cash or trade-in value.	1.18	3
35	I think it is important to donate my old devices to charity.	1.1	3
8	If they paid me, I'd recycle.	0.98	3
18	I think that unless my devices are broken, they are valuable to someone and can be used.	0.89	3
Statement No.	Most Unlike Statements	z-Score	Array Position
33	The government shouldn't use my tax dollars for recycling programs; it's my choice what I support.	-0.95**	-3
15	Electronic waste does not contribute to air or water pollution.	-1.01	-3
1	I often feel like my electronic devices are an extension of my identity.	-1.17**	-3
14	As far as I know, electronic devices do not contain materials that are hazardous for the environment.	-1.3	-3

29	I feel like recycling electronic equipment is a waste of my time; they just throw it in a landfill.	-1.33*	-4
4	I like to keep up with the latest trends and styles, so I am one of the first in line to get the newest device!	-1.36	-4
27	Recycling doesn't make a difference to me. So why do it?	-1.57	-4
2	I name my electronic devices. (Give them names.)	-1.84	-5
32	I don't want to "Be Green."	-2.06**	-5

Note: *Distinguishing Statement $p < .05$; (**) Indicates Significance at $p < .01$

The three emerging themes for *Convenient Environmentalists* were social responsibility convenience and incentive. *Convenient Environmentalists* do not place an intrinsic social value on self-reliance or self-management in order to accomplish sustainable behavior, they believe that in the absence of convenience that there should be incentive to recycle. *Convenient Environmentalists* are socially responsible individuals who will recycle when given an opportunity that is geographically convenient or when they are rewarded with financial reciprocity.

Convenient Environmentalists have high knowledge of the issues regarding the environment from a theoretical perspective (#15, -3; #14, -3). They understand the impact that recycling has on the environment and that it preserves resources for future generations (#26, 5; #28, 4) From a practical perspective *Convenient Environmentalists* feel a social responsibility to act sustainability (#32, -5) and that their actions make a difference, even if a small one (#29, -4; #27, -4). "There is no reason that people shouldn't be able to contribute a small part by recycling, but I wish they made it easier to do it" (Participant 8).

Convenient Environmentalists are not necessarily aware of how they should recycle (#21, 4) even if they know they should be recycling. In fact, having recycling programs advertised managed by their schools or the government is seen a desirable option because it places the onus on an authority figure to direct their sustainable behaviors (#42, 5). Owing to their pragmatic natures, *Convenient Environmentalists* can be apprehensive about recycling at times not sure if they should hang on to their devices for potential future use (#37, 4). They also wonder whether giving their devices to charity is more socially responsible (#35, 3) than what they perceive as common disposal in recycle bins.

In a post-sort interview, Participant 8 indicated “Recycling is obviously important. I think that recycling things like trash is easier because there are bins everywhere. If there were recycling bins like that for phones or something, it would feel like I was throwing something expensive away like it was trash. Can anyone just decide to reach in and take out an old phone or something and use it?” *Convenient Environmentalists* would like to receive financial incentive to recycle (#10, 3) to not only solidify that the devices will be used for a greater use, but to offset any inconvenience that they may experience (#8, 3).

Likely Narrative Based on Data

“Jeremy” is a 20-year-old undergraduate studying business administration. From a middle-class family, he has student loans and works part time at the local coffee shop to supplement his income while in college. During the recent recession, he saw his parents struggle with the loss of a job and subsequently some of the monies saved for his college education. However, his parents gave Jeremy and his younger brother a gaming console, a cell phone and a computer, even though these items were not always the latest models. Now that Jeremy is working and purchasing his own electronic devices, it is important that he get the best price and

he wants to be incentivized to recycle or trade-in his old devices for value. He believes “This is how things work- with cars, homes, clothes and even electronics.” He believes in recycling, upcycling, and donating old items. Jeremy, like most of his friends, thrives on getting name brand or high end items at a discount and frequently purchases gently used items online or in consignment stores. He is positive yet cautious with his money and believes that the key to solving the worlds problems is through working together and bipartisanship (in fact, he does not believe in one political party more than the other just the issues themselves). While he wants to do right by the planet, he is more concerned about his fellow man and the fate of the world with hate, crime and social injustice.

A narrative that would appeal to “Jeremy” must make recycling a part of a larger solution to correct social injustice and should not refer to environmentalism or sustainability- two characteristics that have lost effectiveness with those represented by *Convenient Environmentalist*. Gifford and Sussman (2012) found that these “altruistic, and post-materialist values, as well as increased levels of tolerance and understanding, all predict high levels of environmental concern” (p. 70). *Convenient Environmentalists* are thrifty both in terms of their possible personal expenditures and concerned about the ultimate effect that a government-run program might have on their taxable income. *Convenient Environmentalists* exhibit an overall frugality represented by a cohort who has higher levels of student loans and lower expectations for jobs upon graduation than previous generations. Participant 8 further indicated, "I would say I like technology, but I don't have to be the first in line and pay so much to have it. I will just wait until it is less expensive. Then they have the bugs worked out anyway."

Factor 2: *Gadget Guru*

Participants who were identified as significant sorters for Factor 2 are characterized as

Gadget Gurus. The individuals can be described as successful, confident, free-spirited, and at ease with technology (Barton, Fromm, & Egan, 2012). Of the five sorts that defined this perception, four were female and one was male. There were three graduate students and two were undergraduate students. Additionally, all of the females sorting for this viewpoint indicated higher middle family income while the male indicated his family was middle income. Participants who had sorts loading for this viewpoint had higher significant loads than the other two viewpoints.

Gadget Gurus buy the latest technology and prefer to sell their old devices. They are confident, trendsetting and consider themselves leaders among their peers. They thrive on being validated and recognized for their behavior and want to be incentivized in order to act sustainably. Whether they are seeking approval from their peers or affirmation from authority figures, *Gadget Gurus* are ambitious and feel like their sustainable behaviors have been successful when they have a measure of validation and recognition.

Gadget Guru had five statistically significant loaded participants (Table 4) and describes 17 percent of the total variance. The reliability of this viewpoint is 0.952. The highest positive and negative scoring statements can be found in Table 4 along with the distinguishing statements which are denoted by an asterisk.

Table 4

<i>Factor 2: Gadget Guru</i>			
Statement No.	Most Like Statements	z-Score	Array Position
4	I like to keep up with the latest trends and styles, so I am one of the first in line to get the newest device!	1.76**	5
18	I think that unless my devices are broken, they are valuable to someone and can be used.	1.67**	5
41	I would recycle my devices if there were an advertised	1.65**	4

	recycling event near me.		
38	It's hard to find the time to recycle or sell my old devices.	1.23**	4
22	Even devices I consider to be very old are good to recycle.	1.23*	4
12	It is just easier to replace electronic devices than to try and repair them.	1.18*	3
35	I think it is important to donate my old devices to charity.	1.05	3
1	I often feel like my electronic devices are an extension of my identity.	0.98*	3
10	I feel like I should be able to trade in old devices for cash or trade-in value.	0.95	3
Statement No.	Most Unlike Statements	z-Score	Array Position
34	Recycling isn't a big deal- I don't really think about it.	-1.03	-3
32	I don't want to "Be Green."	-1.08	-3
27	Recycling doesn't make a difference to me. So why do it?	-1.12	-3
39	Recycling is Confusing.	-1.15	-3
3	My recycling doesn't make any overall impact.	-1.171	-4
31	It's more important to be concerned about other environmental problems than to recycle.	-1.2	-4
11	I feel like it is okay to throw away cheap electronic devices such as inexpensive MP3 players.	-1.33	-4
2	I name my electronic devices. (Give them names.)	-1.48	-5
36	Recycling is inconvenient and hard to do.	-2.35	-5

Note: *Distinguishing Statement $p < .05$; (**) Indicates Significance at $p < .01$

The themes that best described the *Gadget Guru* viewpoint were that of ultimate consumers, have a need for validation and recognition and want to be incentivized for recycling or acting sustainably. Participants who are characterized as *Gadget Guru* are best described as trendsetters; they are the first to buy the newest electronic devices (#4, 5). Participant one stated, "My smartphone handles most of what I do like texting, pictures, social media and surfing the

web - unless I have to do stuff for school - but it is nice to have a tablet or an e-reader if I want to use them for things like watching movies."

Self-identifying as early adopters, *Gadget Gurus* enjoy the social trappings of new and multiple devices (#4, 5) and perceive themselves to be fashionable, innovative and influential with their peers. As a result, indicating that they feel as though electronic devices are an extension of their identity (#1, 3) and they are more inclined to replace their devices than to fix them if they become broken which they perceive as immediate obsolescence (#12, 3). These participants indicated that finding the time to recycle is difficult (#38, 4) but would consider recycling if it was convenient (#41, 4). More likely to prompt sustainable behaviors than convenience is their need for validation and recognition for acting in a socially responsible way. *Gadget Gurus* thrive on the affirmation of authority figures and acceptance from their peers; therefore, sustainable behavior is often undertaken with these in mind. As such, *Gadget Gurus* feel like their efforts make a difference (#3, -4) and that recycle is more important than other environmental problems (#31, -4) Regarding this theme, Participant 2 stated, "Oh yes, it is very important to be socially responsible. I was philanthropy chair for my sorority so I really understand how important it is to get people involved."

Because their devices are not obsolete at the point of disposal (#4, 5), they are supportive of recycling initiatives (#41, 4), but seek financial incentives to prompt sustainable behaviors (#18, 5). In the post-sort interview, Participant 1 indicated: "I mean sure I know all about recycling paper and plastics, but electronics should really be sold or reused rather than just thrown away or recycled." Participant 1 further indicated "Even when I know I can sell one of my old devices, it is hard to find the time to do it. It is just easier if one of my friends wants to buy it. I am probably getting more money by selling it to my friends than with some company

that buys iPads and iPhones.”

Likely Narrative Based on Data

“Jessica” is a 24-year-old graduate student studying English literature and mass communications. She is from a small affluent suburb of Tulsa and, though she has part of her tuition covered from a teaching assistant position, has family assistance for the remainder of her school tuition. Her parents are professionals and would be considered upper middle class. She has an older sister, though she has been treated more like an only child since her sister is 7 years older. Throughout high school and as an undergraduate student she did not have a part-time job, but filled her free time outside of her studies by participating in various on-campus clubs and was a member of a sorority. Considered stylish and outgoing, Jessica has always been one of the first to have the latest iPhone, tablet or MacBook. When she upgrades her small electronic devices, she feels as though a substantial trade-in value should be offered since the devices are still being used and purchased by many consumers. She also sells many of her old devices to friends feeling like she gets more money by selling it to them at a “discount” rather than trading in or recycling for an insulting amount. She considers herself to be technology-savvy, trend-setting, intelligent and ambitious. The narrative that would best suit Jessica would frame environmental change as popular and fashionable while feeding her ego as a good environmental steward and making use of technology to facilitate the behavior.

Factor 3: *Throwaways*

Of the three sorts that defined this perception, two were male and one was female. Two of the sorters indicated they were pursuing graduate degrees and the third was pursuing a bachelor’s degree. This viewpoint represented the lowest reported family income of all the viewpoints, with the female indicating a family with lower middle income, the two males

indicating both middle income and very poor to describe their families.

Factor 3 has been designated as *Throwaways* because of their uninspired attitudes toward environmental stewardship. *Throwaways* also assert that electronic devices are ripe for traditional waste disposal once they have subjectively determined the device has reached the end of its useful life. Despite understanding the benefits recycling, *Throwaways* indicate that they do not give much personal consideration to how they can safely dispose of electronic devices citing inconvenience and a lack of monetary incentive as reasons for inaction. *Throwaways* describes 10 percent of the total variance and the reliability of this viewpoint is 0.923. The highest positive and negative scoring statements can be found in Table 5 along with the distinguishing statements.

Table 5

Factor 3: Throwaways

Statement No.	Most Like Statements	z-Score	Array Position
12	It is just easier to replace electronic devices than to try and repair them.	2.07*	5
1	I often feel like my electronic devices are an extension of my identity.	1.79*	5
26	Recycling helps our climate problems.	1.61	4
10	I feel like I should be able to trade in old devices for cash or trade-in value.	1.55	4
21	I am not really sure what to do with my old devices.	1.14	4
19	Recycling means disposing of things in a specific safe way.	0.93	3
13	Electronic waste is a real problem in our environment.	0.86	3
34	Recycling isn't a big deal- I don't really think about it.	0.82**	3
36	Recycling is inconvenient and hard to do.	0.8	3
Statement No.	Most Unlike Statements	z-Score	Array Position
11	I feel like it is okay to throw away cheap electronic devices such as inexpensive MP3 players.	-0.86	-3

37	I think it is important to keep old devices in case I need them later on.	-0.98**	-3
4	I like to keep up with the latest trends and styles, so I am one of the first in line to get the newest device!	-0.98	-3
20	My trash at home gets recycled even if I don't sort things.	-0.99	-3
15	Electronic waste does not contribute to air or water pollution.	-1.15	-4
27	Recycling doesn't make a difference to me. So why do it?	-1.21	-4
25	I believe recycling electronic devices saves lives.	1.26**	-4
5	I am sentimental toward some electronic devices because they remind me of different events in my life.	1.73**	-5
2	I name my electronic devices. (Give them names.)	-2.59*	-5

Note: *Distinguishing Statement $p < .05$; (**) Indicates Significance at $p < .01$

Emerging themes represented by the Throwaways include a sense of apathy toward environmental stewardship; they have an understanding of recycling but do not believe that it applies to electronic devices. Rather than not knowing how to change their behaviors, *Throwaways* do not know that they should be modifying any of their disposal habits, but feel as though the government would manage such programs if it was important.

Throwaways do not feel sentimental or name their devices (#5, -5; #2, -5) and are more likely to discard electronic devices in an unsustainable way than participants who loaded on other viewpoints (#12, 5). “Separating trash into separate containers doesn’t really make any difference in the grand scheme of things” (Participant 16). They believe that devices are a symbol of status, convenience and social identity (#12, 5; #1, 5). *Throwaways* do not have strong opinions about compulsory recycling programs since they give very little consideration to recycling on the whole (#34, 3). Exemplifying the theme of apathy and disregard, Participant

16 indicated, “Well yeah, obviously if the government or somebody told me that I have to recycle I would, but I honestly don't see the point in it. Does it really matter, really?”

Because they often do not have devices they consider to be of high value, *Throwaways* are more likely to discard old devices like typical household waste. In a post-sort interview, Participant 16 stated, "Look it's not like I have the latest and greatest anyway, so when it breaks or I get something new I just toss it. Who would want it anyway?" To encourage proper disposal, *Throwaways* indicated that they would like be incentivized regardless of the value of their devices (#10, 4): “If I thought I was going to get cash for turning in an old phone, yeah I might think more about it!” and “It is not like it matters or anything, but if someone is willing to pay me for something I have lying(sp) around, then yeah I might consider doing it. It just depends on how much I might get for my old devices” (Participant 16). However, Participant 16 further stated, “I mean if it isn’t much money or if I just get a gift card or something then it probably isn’t worth my time” (Participant 16).

Likely Narrative Based on Data

“Jasper” is a 19-year-old male undergraduate student majoring in pre-law. He works part-time as a bartender and earns excellent tips, and relies on student loans, grants and family assistance to cover his tuition and living expenses. He has an active and spirited social life and is rarely sitting at home alone on Saturday evenings. During a weekend tag football game with some of his college buddies, his newer phone was damaged and the screen was cracked. Jasper’s response was “Dudes, the screen still works, but its just an old piece of junk anyway! Nothing stops our game!” He then tossed the phone ten feet away without sparing it a second glance. Electronic devices, are disposable to Jasper and treated haphazardly because they can be easily replaced and he does not own the latest device creating the perception that when he decides a

device is no longer useful it is at its end-of-life and ripe for quick disposal. He does not see the benefit in recycling or acting in a sustainable way and feels like programs trying to encourage him to do so are “Just a bunch of marketing.”

Viewpoint Similarities

The three views shared some similarities. These consensus statements represent those statements for which there is not significant difference or distinguish between any set of factors (Brown, 1997). The consensus statements are shown in Table 6 with their array positions and z-scores. Consensus statements are those not sorted and placed in significantly different areas on the foam board by the participants for the three viewpoints.

Table 6

Consensus Statements

Statement	<i>Convenient Environmentalist</i>		<i>Gadget Gurus</i>		<i>Throwaways</i>	
	Array	z-score	Array	z-score	Array	z-score
7 I believe that electronic devices are too expensive to throw away or recycle.	1	0.42	0	0	0	0.29
8 If they paid me, I'd recycle.	3	0.98	0	0.37	2	0.73
10 I feel like I should be able to trade in old devices for cash or trade-in value.	3	1.18	3	0.95	4	1.55
13 Electronic waste is a real problem in our environment.	2	0.49	2	0.77	3	0.86
14 As far as I know, electronic devices do not contain materials that are hazardous for the environment.	-3	-1.3	-2	-0.75	-1	-0.5
15 Electronic waste does not contribute to air or water pollution.	-3	-1.01	-1	-0.65	-4	-1.15
16 Discarded devices can't decompose, but otherwise don't present any danger in a landfill.	-2	-0.61	-1	-0.32	-2	-0.63

20	My trash at home gets recycled even if I don't sort things.	-2	-0.94	-1	-0.58	-3	-0.99
21	I am not really sure what to do with my old devices.	4	1.38	2	0.66	4	1.14
23	If I recycle or throw away electronic devices all of my data may be stolen.	-1	-0.17	0	-0.05	1	0.3
24	I think that my information is on the device even if I have erased everything.	0	0.01	-1	-0.54	0	0.24
27	Recycling doesn't make a difference to me. So why do it?	-4	-1.57	-3	-1.12	-4	-1.21
30	I think cell phone turnover every one to two years "has become the prime emblem of a throwaway society in the digital age."	1	0.29	1	0.62	2	0.75
40	I think people should disassemble electronic devices they no longer use.	0	-0.02	0	-0.28	-1	-0.47

Note: Consensus Statements: Those That Do Not Distinguish Between ANY Pair of Factors. All listed statements are non-significant at $P > .01$.

Reflecting agreement for the three viewpoints, consensus statements reflect the theme of incentive and knowledge. Participants all exhibit a general awareness and understanding of recycling and its benefit to the environment; however, the high salience of statement 27, "Recycling doesn't make a difference to me. So why do it?" indicates that these Millennials do not feel as though their individual efforts toward sustainable behavior has any real effect on the environment. One participant said "Does me recycling my phone or computer really make a difference when there are 7 billion people and billions of electronic devices being thrown away? Sorry, but I really doubt it."

Consistent with Millennials desire to be recognized, most participants indicated that they feel as though they should receive a financial reward for recycling their electronic devices. This is further supported by the encounters I had with students to recruit them for the study. More than one participant qualified that their participation in the study would receive some form of

reciprocity before they agreed to participate. Several times the initial response to my request for participation was “No I do not have time.” Upon explaining that they would receive a \$5 Starbucks gift card in exchange for their time, all but one student immediately consented and made time to participate. This is consistent with the literature who indicates Millennials believe that their time is valuable and place a great deal of importance on being adequately rewarded and acknowledged.

Finally, the statement “I am not really sure what to do with my old devices” represents the most interesting consensus statement the the researcher. All participants have sufficient knowledge of recycling practices; however, they ascribe the value-action behavior gap as a lack of understanding. As one participant indicated, “Isn’t there a place on campus where I can recycle my old devices? I don’t know. What if something happens to my phone and I need to use the old one as a backup? I can’t just run down and buy a new phone if I break this one.” The uncertainty about potentially needing a device they no longer use, as well as a lack of awareness of convenient recycling centers, contributes to confusion and inaction by Millennials.

Confounded Sorts

It is interesting to note that of the five confounded sorts, two participants had sorts loading on *Convenient Environmentalist*, one on *Gadget Guru* and one on *Throwaways*. Only one sorter, a 20-year old male with higher middle income did not load significantly on any of the three viewpoints though his highest load (0.369) was on *Gadget Guru*. Confounded sorts represent participants who do not strongly identify with any of the emerging viewpoints. Together they do not represent a fourth distinct viewpoint, but rather they represent an indication that there are other viewpoints which may more accurately reflect their attitudes toward electronic waste and recycling.

Research Question 2

The second research question in this study was: *What demographic descriptors help to understand perceptions regarding the recycling of discarded electronic devices?* Twenty students sorted ranging in age from 18-25 with an average age of 22.3. All of the females who sorted were Caucasian, while six of the males were Caucasian, two were African American, one was of Middle Eastern decent and one was Hispanic. Ten of the participants were solicited at a public four-year university, while the other ten were solicited at a private, four-year university that has a Protestant, Christian affiliation. Ten of the students were pursuing bachelor’s degrees and the other ten were pursuing graduate degrees.

As shown in Table 7, there was no distinction among the views with regard to the number of devices owned, or whether the participant was enrolled in a private or public university. While Gadget Gurus was predominantly female, the only notable demographic was socio-economic status. Overwhelmingly, *Convenient Environmentalists* indicated that they acme from middle class families, *Gadget Gurus* indicated that they came from higher income families, and *Throwaways* indicated they came from lower income families.

Table 7

Demographic Summary for the Three Viewpoints

	Number Devices	Gender		Socio-Economic Status			University Type	
		Female	Male	High	Middle	Low	Public	Private
Convenient Environmentalist	2-4	3	4	2	4	1	2	5
Gadget Guru	2-4	4	1	4	1	0	4	1
Throwaway	2-4	1	2	0	2	1	2	1

Chapter Summary

This study was conducted to examine Millennials' attitudes with regard to discarding or recycling small electronic devices using the following two research questions to guide the study, data collection and subsequent analysis: 1) What are the perceptions of Millennials regarding electronic waste recycling? And 2) What demographic descriptors help to understand perceptions regarding the recycling of discarded electronic devices?

Using Q-methodology, participants were asked to sort the 42 statement grouped into the following categories: personal connection/identity, monetary- related, knowledge base, security, social relevance, and convenience. In this chapter, I included the data analysis for how the final factor solution was determined. The three emerging viewpoints are *Convenient Environmentalist* (Factor 1), *Gadget Guru* (Factor 2), and *Throwaways* (Factor 3). These viewpoints were interpreted and a detailed description of the findings was presented for each research question. Conclusions, implications of the study, and recommendations for future research are presented in Chapter V.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Despite the tremendous volume of e-waste generated in the United States, only about 10 percent of the electronic waste is recycled (Sachs, 2006). The primary disposal of electronic waste in the United States is landfills and incineration (Kang & Schoenung 2005). Progress toward safe management of e-waste disposal has been slow and recycling practices have lagged significantly behind the rate of innovation and technology manufacturing. As a global epidemic, e-waste has incited a need for a greater understanding of how consumers dispose of electronic waste, recycle electronic waste, and how sustainable behavior may be influenced among consumers who are the earliest adopters of electronic devices: Millennials. The inclusion of Millennials in research on e-waste recycling is critical to contribute to the field of environmental sociology, marketing and sustainability since the cohort's purchasing and disposal activities outnumber those of other generations.

This chapter includes a summary of the study and follows with conclusions for the two research questions. Implications for theory and practice are included as are recommendations for future research.

Summary of the Findings

The purpose of this study was to examine the perceptions of Millennial consumers with regard to electronic waste. The following research questions provided the foundation for the study development and subsequent analysis:

1. What are the perceptions of Millennials regarding electronic waste recycling?
2. What demographic descriptors help to understand perceptions regarding the recycling of discarded electronic devices?

As described in chapter III, the study utilized Q methodology as a research instrument to understand the subjective attitudes toward electronic waste by Millennials aged 18-25. Twenty participants were asked to perform a sort of statements denoting the statements on a forced distribution from “most unlike me” to “most like me.”

The Q method study was completed using five steps. The first step involved the development of the concourse, which could come from all relevant discourse, such as interviews, participant observations, popular media, or academic literature (van Exel, 2005). The second step involved the development of the Q set, which consisted of sampled statements from the concourse and consisted of 42 statements. Third, consisted of recruiting participants for the study. The next step involved sorting statements by participants. Finally, analysis and interpretation of Q sorts occurred (van Exel, 2005). In the analysis phase, the researcher used PQMethod software to look for patterns within the population of participants.

A matrix of three factors was generated from the data. For each of the emerging factors, data analysis was analyzed using factor analysis, factor rotation, and the calculation of corresponding factor scores (*z*-scores) with rankings. Factor analysis of Q sorts represented clusters of sorts by participants and allows the researcher to interpret the data in a way that lends

itself to rich descriptions and themes. The final three emerging viewpoints were called “*Convenient Environmentalist*” (Factor 1), “*Gadget Guru*” (Factor 2), and “*Throwaways*” (Factor 3).

Convenient Environmentalist

Convenient Environmentalists are highly technical, adaptive, ambitious and confident (Schewe, 2013). However, they are not so technically connected that they feel as though electronic devices are an extension of their identities nor do name their devices in an effort to humanize equipment that aids so many activities in the lives of Millennials. *Convenient Environmentalists* do not hold a personal attachment to their devices, and have a keen understanding of how recycling works. They recognize that e-waste is a problem and that it contributes to water and air pollution.

Current recycling systems do not appeal to *Convenient Environmentalists* inherent desire to personally affect social change and see the obvious results from their actions. BCG (2012) described a subgroup Millennials as being *cautious consumers* who have the distinction of being *globally aware*. There is a sense of pragmatism with the *Convenient Environmentalists* that is not readily apparent or is more muted with the other two perceptions.

Practical, thrifty and social do-gooders, *Convenient Environmentalists* represent the most likely group to engage in sustainable behaviors. Participants with this viewpoint believe in recycling and recognize the importance such programs to protect the environment. They have an awareness of how their electronic waste is affecting the environment but wants to be incentivized or encouraged to recycle in some way if recycle is not easy-to-do or convenient.

Convenient Environmentalists exhibit an awareness of the need for recycling but place the responsibility for behavior management on authority figures. These individuals acknowledge

and support such convenience at the expense of compulsory recycling programs that are managed by government or local municipalities. However, they expressed disapproval at potentially suffering a tax burden to support the cost of such programs thus signifying the onus for such programs should be at the expense of the manufacturer rather than the consumer. Gifford and Sussman (2012) indicated environmental attitudes fluctuate over time and can be influenced by individual determinants including business or government. In general, these individuals have a higher level of satisfaction with the government and their world, feeling a sense of closeness due to their constant connectedness (McNall & Basile, 2013). A sub-Millennial cohort termed *hipennials* provides further justification for *Convenient Environmentalists*: “We found a generation engaged in consuming and influencing, one that embraces business and government and believes that such institutions can bring about global change, one that is generally optimistic, and one that has unexpected attitudes and behaviors” (BCG, 2012, p.4).

. In an article published by NPR, one university student was quoted as saying, “OK, fair enough. I am actually an environmentalist... But I wouldn't say that just anywhere...that's immediately polarizing” (NPR, 2014). Students indicated that traditional “green” terminology has a negative association with their generation and that being coined an environmentalist is not a positive descriptor they wish to identify themselves with. Pew Research Center indicates that fewer Millennials have a positive reaction to the term than previous generations thinking of the term as being *corrupted* or *politicized* (NPR, 2014). Therefore, data supports that *Convenient Environmentalists* can be influenced to elicit positive social change such as recycling with the right narrative.

Gadget Gurus

Gadget Gurus represent some of the most knowledgeable consumers regarding the importance of environmental issues affecting the world (Gaudelli, 2009). They enjoy the social trappings of owning new technology and multiple devices. They perceive themselves to be fashionable, innovative and influential with their peers as a result. The earliest and fastest adopters of new technologies, *Gadget Gurus* often own multiple small electronic devices such as smartphones, tablets and gaming consoles making them particularly important to the conversation of electronic waste recycling (Barton, Fromm, and Egan, 2012).

Participants who are characterized as *Gadget Guru* are best described as trendsetters; they are the first to buy the newest electronic devices. As such, *Gadget Gurus* are considered a larger than average waste generator. Owing to the fact that they own and purchase more devices than other consumer groups, *Gadget Gurus* make decisions to store old devices rather than recycle or dispose of them in a sustainable manner if they have no options to trade-in or sell their unused devices. (Hanks, et al. 2008). They exhibit a high level of awareness, but follow-through of recycling or disposing of electronic devices in a sustainable way is low (Hanks, et al. 2008). *Gadget Gurus* are represented by Millennials who are "open to protecting the environment and natural resources, but not leaders and not interested in being seriously inconvenienced or paying a cost to do so" (AP, 2012, np). As supported in the literature, *Gadget Gurus* represent a group of Millennials who understand the importance of acting in an ecologically relevant and sustainable manner but may not have an understanding of how to adjust their behaviors (Henrich, 2008). These participants indicated that finding the time to recycle is difficult, but would consider recycling if it was convenient or easy to do.

Gadget Gurus desire validation and recognition for recycling or monetary incentives to

do so. *Gadget Gurus* understand the importance of recycling their electronic devices but tend to associate traditional recycling techniques, such as collection bins, with disposal rather than with the understanding that the item will be reused in some capacity. *Gadget Gurus* already have attitudes that support sustainable behaviors, but are not completing the value action gap toward modifying their behaviors. Because their devices are not obsolete at the point of disposal, they are supportive of recycling initiatives, but seek financial incentives to prompt sustainable behaviors. A narrative approach that validates sustainable behavior with being a leader and a trendsetter might be an effective strategy to engage *Gadget Gurus* so they can be convinced how their actions can make a difference for themselves and future generations (McNall and Basile, 2013).

Throwaways

Throwaways are characteristic of Millennials discussed in the literature review who embrace their status as “Digital Natives” or the “Plastic Generation.” Owning fewer devices on average than the other two viewpoints, a single device represents a point of social connectedness for *Throwaways*. They do not feel sentimental toward their devices and more likely to throw away or discard electronic devices in an unsustainable way than participants sorting for the other two viewpoints. Lacking sentimentality toward devices, they do not believe that recycling devices is worthy of their time and effort and often disguise their apathy as confusion or misunderstanding.

Representing the lowest income for the three viewpoints, *Throwaways* are unique in their perceptions of environmental goals. Stenner and Nwokora (2015) indicate that for poorer communities, there is a lessor connection between values and environmental attitudes because these communities have different experiences with environmental events than higher income communities. With poorer communities there is less focus on the materialist “calculations of

the costs and benefits of environmental protection” because the obstacles they pose are likely to prevent citizens from holding extreme views (p. 4913).

In the same way that one would say “Recreational drug use or fast food is unhealthy and individuals disregard the warnings and indulge in these things, *Throwaways* are not necessarily less-informed about environmental threats, but they have little empathy toward changing their behaviors. Although the data from the study indicates that the participants who sorted for this viewpoint have a less than average knowledge of environmental issues, post sort interviews demonstrate that this is not accurate. Participants disguise their lack of motivation to dispose of electronic devices in a sustainable manner and desire to not be inconvenience as confusion or misunderstanding of recycling programs. *Throwaways* display the characteristic described by Boston Consulting Group *slacktivism* whereby they support socially relevant of environmentally-oriented causes only if there is little personal effort required. (Barton, Fromm, and Egan, 2012).

Throwaways represent the most difficult type of personality to encourage sustainable behavior. However, government or regulatory statutes could force behaviors from *Throwaways*. *Throwaways* would rather have tax dollars contributed to managing the safe disposal and recycling of electronic devices than act on their own accord to act responsibly. Even if recycling is required by a compulsory program, *Throwaways*’ attitude will still remain that recycling does not have any personal value. Narratives about recycling and its effects on the environment will not be very effective in urging these consumers to recycle.

Conclusions

Despite representing different viewpoints there were some commonalities. The three viewpoints, *Convenient Environmentalist*, *Gadget Gurus*, and *Throwaways* all indicated an

awareness and understanding of recycling and its benefit to the environment convenience while asserting that they are uncertain about where and how to recycle devices. Each three viewpoints also corresponded on receiving incentive such as financial reciprocity in exchange for recycling electronic devices. Finally, participants on the three viewpoints suggested that they do not feel as though their individual efforts toward sustainable behavior has any real effect on the environment.

The three emerging viewpoints, *Convenient Environmentalist*, *Gadget Guru* and *Throwaways* reflected several conclusions including Social Responsibility, Validation and Recognition, Convenience, and Incentive. Each of these thematic conclusions is reflected differently in the three viewpoints, making each one distinct yet also influenced by the generational characteristics referenced in the literature. Understanding these nuances is importance as a “once-size-fits-all” approach to narrative may not be the most effective in reducing the value-action gap that exists with Millennials.

One conclusion relates to social responsibility. The three viewpoints have diverging thoughts regarding social and environmental responsibility. *Convenient Environmentalists* are altruistic by nature, both understanding the role that recycling plays in the environment and as a personal value orientation. This group wants to be good environmental stewards for the sake of doing what is socially responsible. *Gadget Gurus* believe that environmental responsibility is expected to be recognized as being a role model for others. These ambitious individuals seek recognition for good behavior and are more charitable in their giving and recycling behaviors in public, social settings such as recycling fairs or a sponsored cell-phone drive to support the troops. *Throwaways*, on the other hand, hold very little regard for social and environmental responsibility indicating that it does not affect them personally or matter to others if they do not

act sustainably.

A further predominant conclusion which emerged from the findings was that of validation and recognition. *Convenient Environmentalists* appreciate when they receive recognition or have their actions validated by an authority figure, but it does not figure prominently as an incentive for provoking sustainable behavior. Similar to their attitudes of social responsibility, *Gadget Gurus* are socially responsible with an agenda toward validation. Public recognition and/or validation by authority figures or important peer groups encourage *Gadget Gurus* to engage in sustainable behaviors. *Gadget Gurus* want to be perceived as social leaders with a wide sphere of influence, and such types of validation or recognition appeal to their socially ambitious personalities. *Throwaways* are neither seeking recognition nor validation because they do give any credence to sustainable behavior noting “It doesn’t matter” (Participant 16). Their apathy toward programs supporting recycling or environmental goals supersedes any need for positive validation or recognition.

Two of the viewpoints indicated that convenience was a key factor in determining the success of recycling programs. *Convenient Environmentalists* have behavior that is most adversely affected when there are not recycling centers that are convenient to them. With easy accessibility to recycling bins or centers these individuals will recycle. In the absence of convenience, *Convenient Environmentalists* need to be incentivized to seek out recycling options outside of their immediate area. *Gadget Gurus* seek convenience coupled with incentive, or convenience coupled with recognition. Where there is only one motivator of behavior, they are unlikely to modify their behaviors. Finally, *Throwaways* could have abundance of convenience (i.e. a door-to-door collection) and they would not be prompted to change their behaviors owing to the fact they are indifferent to environmental stewardship on the whole.

As reflected in the consensus statements, participants on all viewpoints indicated that monetary incentive such as trade-in value, resell, and deposit refund appeal to Millennials when deciding to recycle electronic devices. For *Convenient Environmentalists*, who are aware of the need to recycle and seek convenience to elicit a behavioral response, monetary incentive could reduce the dependence of accessibility as a motivating factor. In a post-sort interview, Participant 1 suggested that recycling could be both easy and rewarding: “What if they had recycling machines like those machines that recycle aluminum cans and give you money? It would be convenient, you would get paid and you wouldn’t feel like you just threw the device in a trash bin.” *Gadget Gurus* indicated that monetary incentive was a good motivator to encourage recycling; however, participants justified that reimbursement was assumed if they were to recycle as they own devices which they do not consider to be obsolete. Conversely, *Throwaways* do not have the most recent technology, but indicated that if they could get paid for recycling it may or may not change their behavior.

Implications for Theory

In order to elicit a positive response and ultimately change the behaviors of a generation, it is important to understand the inherent personality characteristics that will prompt positive action. Millennials are savvy, both being digitally-connected to information and one another, yet they are not as independent as previous generations. They thrive on social-connectedness, a sense of belonging, relationships and approval from peers and authority figures. These personal relationships have been instrumental in creating a generation of capable, confident individuals, but who also seek affirmation and individualistic recognition.

In order to understand their value orientation with regards to sustainable attitudes and behaviors, it is important to theorize the effect of peer narratives in closing the value action gap.

Further there are implications for theory in understanding validation and recognition drivers for Millennials with regard to environmental sustainability.

Implications for Practice

Although their awareness of environmental issues and recycling programs is greater than other generations, Millennials are less apt to take action without being incentivized or if they have been inconvenienced to do so. Trade-in programs or rebates at the point of purchase (POP) for new devices would encourage recycling or safe disposal of electronic devices. When POP is not an option, mail-in programs where they can easily access pre-paid envelopes or convenient drop boxes in places often visited by Millennials could be successful in facilitating behavioral change.

Other implications for practice include implementing mobile or vending recycling centers, as suggested by one participant. Because two of the three viewpoints indicated that behaviors could be incentivized through monetary reciprocity, deposit collection programs or tax incentives are potential implications for practical execution.

Stern (2000) suggested that environmental behavior is influenced by personal attitudes, contextual forces, capabilities, and habits or routines. The researcher suggests that there are four major types of intervention, which include religious or moral approaches targeted at individuals' values, education focused on altering attitudes through information, material incentives aimed toward changing behavior, and community management initiatives that establish common rules and expectations. Stern (2000) suggested that because environmentally significant behavior is complex, it requires multidimensional approaches that specifically target the behavior that should change within its specific context. Therefore, another implication for practice calls for the

integration of the right communicators (such as social media outlets) and influencers to disseminate the narrative to Millennial consumers.

Researchers concur that the transition from positive environmental attitudes to pro-environmental action is not a simple process. As environmental impact has become an increasingly important issue, this definition has evolved to include the intention to change the environment, for better or worse (Stern, 2000). Blake (1999), referred to the issue of converting environmental values into action as the “value-action gap” and noted that the attitude-behavior relationship had two primary, influential variables, “the structure of personal attitudes themselves; and external or situational constraints” (p. 264). According to Blake, individuals are more inclined to act when they have direct, positive experience and attitudes toward something and situational constraints, such as social norms, allow for them to take action. He notes that individual attitudes toward the issue, feelings about who is responsible for the issue, and obstacles in practicality prevent individuals from transitioning from environmentalist values to action. Instead of simply informing individuals about their responsibility in an issue, agencies should elicit action by establishing the structures, tools, and know-how for individuals to enact participation (Blake, 1999). Finally, encouraging sustainable behavior through authority figures such as university campuses, either rewarding or validating the behavior among their peers is an important implication for practice.

Recommendations for Future Research

Future research that tracks a group of consumers over a period would be a consideration for future research and yield a more comprehensive understanding of developmental changes and environmental stewardship. Additionally, research that studies a broader age range of Millennials, rather than 18-25 year olds, including those that are at the higher end of the age gap

could yield interesting and different information regarding this important cohort. Future research might also analyze sustainable behavior by better understanding how and what narratives from peers and authority figures positively close the value action gap and elicit positive behavioral responses.

Limitations

In this study, there were several notable limitations. First, I interviewed a small group of Millennials about their awareness of electronic waste in a single moment of time, rather than analyzing perceptions or changes in a longitudinal study. The small number of participants, the small geographic area of the study, and the non-random group of Millennials interviewed, limits the generalizability of the study's findings. Furthermore, van Exel and de Graaf stated, "The results are the distinct subjectivities about a topic that are operant, not the percentage of the sample (or the general population) that adheres to any of them" (p. 3). Findings generated from a Q study cannot be generalized beyond the participants of the study, but results represent authentic perspectives of the problem being studied. No one participant can directly identify with the typologies generated from the Q sort; however, the resulting findings should be understood to approximate the opinions of the entire groups, thusly being representative (Brown 1993). The viewpoints uncovered by the Q sort and subsequent factor analysis did not necessarily reflect all possible viewpoints participants might have toward the phenomenon being studied. Any motivators established during the course of the research could not be all-inclusive and should be further studied against a larger sample.

As a novice researcher, I represented another limitation in the study. However, as the parent of a son who represents a so called "Digital-Native," a manager of Millennials whose age is representative of the sample, and with a 15-year career, marketing to individuals of this age, I

felt as though I had a unique perspective of this group of consumers.

Final Comments and Recommendations

Considered some of the earliest and fastest adopters of new technologies, Millennials own multiple small electronic devices such as smartphones, tablets and gaming consoles making them particularly important to the conversation of electronic waste recycling (Barton et al., 2012, p. 5). Despite being a highly educated cohort and representing some of the most knowledgeable consumers regarding the importance of environmental issues affecting the world (Gaudelli and Heilman, 2009), even those Millennials with a higher level of awareness do not exhibit more sustainable purchasing behaviors or did these more-informed Millennials dispose or recycle electronic waste in more sustainable ways (Hanks, et al. 2008, p. 336).

Generation X and Baby Boomers may have a greater tendency toward sustainable behavior due to the cultural and social encouragement they experienced during the 1960s and 1970s and the subsequent public campaigns for consumers to reduce, reuse, and recycle (Weirnik and Ones, 2014). However, literature suggests that later generations have become less concerned with sustainable behaviors because the 1990's saw an era when "pro-environmental messages were less common in the media and in schools" (Weirnik and Ones, 2014, p. 845). However, participants in this study confirmed that it is not a lack of knowledge that prevents sustainable behavior, but learned behaviors from an overarching passive narrative. "Being green" is a decidedly passive approach which elicits as much apathy as an apocalyptic narrative where Millennials feel there is no hope at all. Manufacturers, NGO's environmental groups and others who try to encourage green behavior take a piece of the narrative and apply a one-size-fits-all approach without understanding Millennials holistically.

It has become a trend for environmental storytellers and scientists construct a narrative whereby threats, catastrophe and peril provide the moral framework (Brummett, 1991), fear discourse ultimately interrupts the positive feedback loop and instills a sense that “certain events and experiences are inevitable, unalterable, and determined by external forces beyond human control” (Wojcik, 1996, p. 298). The shifting narrative from positive to negative messaging that has occurred has created a generation of Millennials who exhibit a high level of awareness or motivation; however, follow-through of recycling or disposing of electronic devices in a sustainable way is low (Hanks, et al. 2008, p. 338). Because Millennials tend to be skeptical of environmental narratives, they need messages framed in a positive way that corresponds with their value systems in order to elicit a response (McNall and Basile, 2013, p. 300). If environmental labels are used to persuade sustainable behavior of Millennials as then those should not only be specific, but the narrative surrounding the claims should be meaningful to the consumer (Ottman, Stafford, and Hartman, 2006).

As a human way of organizing a difficult to understand or particularly distressing reality, narrative is critical to influencing environmental change (Cronon, 1976). “The missing pieces are the dialogues necessary to connect the increasingly obvious planetary changes with the deepest motivations of every person as a steward of planet Earth” (Moore and Nelson, 2010, p. 754). Using a positive environmental narrative to frame social issues can engage individuals because the issue itself becomes a story by which the listener can attach a personal lens or frame of reference and recognize the imperative consequences of actions when they go unchecked in society.

Having been desensitized to dire warnings and apocalyptic-style narratives regarding environmental concerns, Millennials can instead be encouraged to make behavioral changes with

a positive narrative that reinforces their belief system. By framing environmental issues in a context both relevant and personal. Dire warnings convey a sense that all hope is lost, rather than enabling changes toward more sustainable attitudes and behaviors. When environmental programs use narrative, the behaviors become expected, positive, convenient, personal and relevant to the lives of individuals engaged in the activity.

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APPENDICES

Appendix A: IRB Approval

Oklahoma State University Institutional Review Board

Date: Monday, May 18, 2015
IRB Application No GC158
Proposal Title: Electronic Waste in the United States: Using Q Methodology to Analyze Sustainable Attitudes of Millennials! Consumers
Reviewed and Processed as: Exempt

Status Recommended by Reviewer(s): Approved Protocol Expires: 5/17/2018

Principal Investigator(s):

Athena Wooldridge
7722 E 102nd St
Tulsa, OK 74133

Denise Blum
206 Willard
Stillwater, OK 74078

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

[] The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval. Protocol modifications requiring approval may include changes to the title, PI advisor, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms

2. Submit a request for continuation if the study extends beyond the approval period. This continuation must receive IRB review and approval before the research can continue.

3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of the research; and

4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Dawnett Watkins 219 Cordell North (phone: 405-744-5700, dawnett.watkins@okstate.edu).

Sincerely,


Dawnett Watkins, Chair
Institutional Review Board

Okla. State Univ.
IRB
Approved 5-18-15
Expires 5-17-18
IRB # GC-15-8

Appendix B

Demographic Questionnaire

1. Please indicate your age: _____
2. Please circle your gender:
 - a. Male
 - b. Female
3. How do you most identify for yourself/family?
 - a. Very poor
 - b. Poor
 - c. Lower middle income level
 - d. Middle income level
 - e. Higher middle income level
 - f. Rich
 - g. Very rich
4. How are you/have you paid for college? (Circle all that apply.)
 - a. Scholarship/Grant
 - b. Family Assistance
 - c. Student Loans
 - d. Other: _____
5. Are you/will be a Pell Grant Recipient?
 - a. Yes
 - b. No
6. Please indicate your area of study: _____
7. Please indicate your highest level of education.
 - a. High School or GED Equivalent
 - b. Some College or Current Student
 - c. Associates Degree
 - d. Bachelor's Degree
 - e. Advanced Degree
 - f. Trade or Vocational School
 - g. Other: _____
 - h. None of the Above
8. Please indicate which degree plan you are currently pursuing:
 - a. Technical degree or Certification
 - b. Associates Degree
 - c. Bachelor's Degree
 - d. Graduate Degree
 - e. Other (Please Specify):

9. Which of the following electronic devices you currently own. Please check all that apply.
 - a. Electronic Reader
 - b. Cellular Phone
 - c. Computer
 - d. Tablet
 - e. Gaming Console
 - f. None of the Above
 - g. Other Portable Device:

10. For each of the following that you indicated ownership, please indicate the number of devices that you have of each type (whether or not working or currently used).

a. Electronic Reader

a. 1 b. 2 c. 3 d. 4 e. 5

b. Cellular Phone

a. 1 b. 2 c. 3 d. 4 e. 5

c. Computer

a. 1 b. 2 c. 3 d. 4 e. 5

d. Tablet

a. 1 b. 2 c. 3 d. 4 e. 5

e. Gaming Console

a. 1 b. 2 c. 3 d. 4 e. 5

f. Other Portable Device:

i. Device Type _____ Number Owned: _____
ii. Device Type _____ Number Owned: _____
iii. Device Type _____ Number Owned: _____
iv. Device Type _____ Number Owned: _____

11. Which of the following electronic devices have you purchased within the past 12 months. Please circle all that apply.

- a. Electronic Reader
- b. Cellular Phone
- c. Computer
- d. Tablet
- e. Gaming Console
- f. None of the Above
- g. Other Portable Device: _____

A follow-up phone interview may be conducted to clarify results. If you would be willing to participate in a phone interview please write your first name (or a code name that you will know) and a telephone number at which you can be reached.

(CODE) NAME _____ PHONE _____

Appendix C

Array and z-Score by Viewpoint

Participants sorted the statements according to the following condition of instruction:
 “What are your thoughts about small electronic devices you no longer use?”

Statement	Convenient Environmentalist		Gadget Guru		Throwaways	
	z-Score	Array	z-Score	Array	z-Score	Array
Personal Connection/Identity						
1	I often feel like my electronic devices are an extension of my identity.	-1.17	36	0.98	36	1.79 2
2	I name my electronic devices. (Give them names.)	-1.84	41	-1.48	41	-2.59 42
3	My recycling doesn't make any overall impact.	0.19	21	-1.17	21	-0.06 21
4	I like to keep up with the latest trends and styles, so I am one of the first in line to get the newest device!	-1.36	39	1.76	39	-0.98 36
5	I am sentimental toward some electronic devices because they remind me of different events in my life.	-0.39	27	0.4	27	-1.73 41
Monetary/Incentive						
6	I don't really think there is any value to one of my old devices.	0.22	19	-0.099	19	0.58 15
7	I believe that electronic devices are too expensive to throw away or recycle.	0.42	14	0	14	0.29 19
8	If they paid me, I'd recycle.	0.98	8	0.37	8	0.73 13

9	I am not willing to just give away my old devices for free.	-0.79	32	0.45	32	-0.24	24
10	I feel like I should be able to trade in old devices for cash or trade-in value.	1.18	6	0.95	6	1.55	4
11	I feel like it is okay to throw away cheap electronic devices such as inexpensive MP3 players.	0.78	10	-1.33	10	-0.86	34
12	It is just easier to replace electronic devices than to try and repair them.	-0.06	25	1.18	25	2.07	1
Knowledge Base							
13	Electronic waste is a real problem in our environment.	0.49	12	0.77	12	0.86	7
14	As far as I know, electronic devices do not contain materials that are hazardous for the environment.	-1.3	37	-0.75	37	-0.05	32
15	Electronic waste does not contribute to air or water pollution.	-1.01	35	-0.65	35	-1.15	38
16	Discarded devices can't decompose, but otherwise don't present any danger in a landfill.	-0.61	31	-0.32	31	-0.63	32
17	Cell phones and smaller items can be thrown away but I worry about throwing away larger electronics such as laptops.	0.36	17	-0.78	17	-0.63	31
18	I think that unless my devices are broken, they are valuable to someone and can be used.	0.89	9	1.67	9	0.64	14
1	Recycling means	0.43	13	-0.3	13	0.93	6

9	disposing of things in a specific safe way.						
20	My trash at home gets recycled even if I don't sort things.	-0.94	33	-0.58	33	-0.99	37
21	I am not really sure what to do with my old devices.	1.38	5	0.66	5	1.14	5
22	Even devices I consider to be very old are good to recycle.	0.42	15	1.23	15	0.46	16
Security							
23	If I recycle or throw away electronic devices all of my data may be stolen.	-0.17	26	-0.05	26	0.3	18
24	I think that my information is on the device even if I have erased everything.	0.01	23	-0.54	23	0.24	20
Social Responsibility							
25	I believe recycling electronic devices saves lives.	0.38	16	0.22	16	-1.26	40
26	Recycling helps our climate problems.	1.72	2	0.58	2	1.61	3
27	Recycling doesn't make a difference to me. So why do it?	-1.57	40	-1.12	40	-1.21	39
28	Recycling preserves our resources and protects wildlife.	1.6	3	0.83	3	-0.31	25
29	I feel like recycling electronic equipment is a waste of my time; they just throw it in a landfill.	-1.33	38	-0.67	38	-0.23	23
30	I think cell phone turnover every one to two years "has become the prime emblem of a throwaway society in the digital age."	0.29	18	0.62	18	0.75	10

3 1	It's more important to be concerned about other environmental problems than to recycle.	0.14	22	-1.2	22	-0.58	30
3 2	I don't want to "Be Green."	-2.06	42	-1.08	42	-0.57	29
3 3	The government shouldn't use my tax dollars for recycling programs; it's my choice what I support.	-0.95	34	-0.13	34	0.75	11
3 4	Recycling isn't a big deal- I don't really think about it.	-0.51	29	-1.03	29	0.82	8
3 5	I think it is important to donate my old devices to charity.	1.1	7	1.05	7	-0.12	22
Convenience							
3 6	Recycling is inconvenient and hard to do.	0.21	20	-2.35	20	0.8	9
3 7	I think it is important to keep old devices in case I need them later on.	1.49	4	0.7	4	-0.98	35
3 8	It's hard to find the time to recycle or sell my old devices.	-0.5	28	1.23	28	-0.75	33
3 9	Recycling is confusing.	-0.53	30	-1.15	30	0.74	12
4 0	I think people should disassemble electronic devices they no longer use.	-0.02	24	-0.28	24	-0.47	26
4 1	I would recycle my devices if there were an advertised recycling event near me.	0.65	11	1.65	11	0.35	17
4 2	I feel like recycling should be advertised and managed by schools or local governments.	1.78	1	0.66	1	-0.56	28

VITA

Athena L. Wooldridge

Candidate for the Degree of

Doctor of Philosophy

Thesis: ELECTRONIC WASTE IN THE UNITED STATES: USING Q
METHODOLOGY TO ANALYZE SUSTAINABLE ATTITUDES OF MILLENNIALS

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Biographical:

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