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Senior Research Thesis

PRODUCTS MADE FROM RECYCLED MATERIALS: A STUDY OF PUBLIC PERCEPTIONS AND WILLINGNESS TO BUY IN YOLA-JIMETA, NORTHEASTERN NIGERIA

By

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PRODUCTS MADE FROM RECYCLED MATERIALS: A STUDY OF PUBLIC PERCEPTIONS AND WILLINGNESS TO BUY IN YOLA-JIMETA, NORTHEASTERN NIGERIA

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DEDICATION

I dedicate this project to my beloved father, Alhaji Ahmad Abdulkadir Mansur, who has always been my strength and has always believed in me. I pray that the Almighty Allah grant him a happy ending.
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ABSTRACT

Products that are made from recycled materials or are sustainably produced are becoming more common and popular globally as people become more environmentally aware. However, these products are often expensive or not widely available. In developing countries, additional obstacles to adoption of such products are lack of awareness and affordability. In this study, I investigated public perceptions of, and willingness to buy, products made from recycled materials in Yola-Jimeta, northeastern Nigeria. Using a structured questionnaire, I interviewed 175 adult shoppers. Using cross-tabulations and logistic regression modeling, I evaluated the influence of demographic factors and level of environmental concern on how willing shoppers were to buy and pay more for three products (bag, basket, and mat) made from plastic bag waste. I also evaluated the role of an educational flyer in affecting public willingness to buy or pay more for these products. Household income was the only significant predictor of customers’ willingness to buy. People from wealthier households were more likely to buy environmentally friendly products even if they cost more. The flyer had a positive impact on
respondents’ willingness to buy. This outcome supported my hypothesis that increased environmental awareness increases shoppers’ willingness to buy environmentally friendly products. However, only 49% of respondents in this study were willing to pay more; therefore, such increased awareness may not be enough to overcome financial obstacles. I recommend the sellers of the products carefully consider price and the socioeconomics of the region where the products are sold, as well as incorporate educational materials or programs into their marketing schemes.
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CHAPTER 1
INTRODUCTION

Waste production has been an inevitable problem in the history of mankind. As human populations continue to grow, so does the production of waste. Waste production increases faster than the rate of urbanization. Every year, 1.3 billion tons of solid waste is produced globally (Hoornweg & Bhada-Tata, 2012). Waste production is predicted to increase to 2.2 billion tons by 2025 and more than double in low-income countries in the next 20 years (Hoornweg & Bhada-Tata, 2012). In the United States alone, about 250 million tons of trash is produced every year (United States Environmental Protection Agency, 2010).

Waste production increases with a rise in a country’s standard of living. As the economic wealth of a country increases, the country’s consumption also increases, which results in the potential increase in the amount of waste produced (Achankeng, 2003). For example, a research conducted in India showed an increase of 49% in the country’s population resulted in an increase of 67% waste production (UNEP, 2001). There are substantial variations in the amount of waste generated between and within countries. More waste is produced in North America, particularly in the United States than in any other region (Figure 1). Waste generation is lower in rural areas than urban areas (Hoornweg & Bhada-Tata, 2012). This may be due to lower densities of people living in rural areas. More than half of the world’s population today live in cities, where waste generation is high.
By 2050, the population of people living in the cities will be as large as the entire human population in 2000. This population will eventually produce a large amount of waste. (Hoornweg & Bhada-Tata, 2012).

Waste Management Practices and Health Implications

The increase in the amount of waste produced will result in the need for a proper waste management technique. In the past, there were no standard waste management practices until the occurrence of some serious pollution incidents due to improper waste management. As a result governments had to enforce regulatory frameworks that deal with the management of waste. The main waste disposal technique for some countries are landfilling and incineration (Giusti, 2009).
Landfilling involves the burying of waste in landfills, while incineration deals with burning of waste materials. Other waste management practices are composting of waste, reusing and recycling (Figure 2). As of 2014, about 136 million tons of the total 258 million tons of waste produced in the United States are landfilled. Some 89 million tons are recycled and composted while the remaining 33 million tons are incinerated (United States Environmental Protection Agency, 2014).

With the advent of science and technology, management of waste became more organized and focused (Giusti, 2009). Nevertheless, poor waste management led to serious environmental and health issues. Specifically, mismanagement of waste leads to water, air and land contamination, which eventually affect public health (Giusti, 2009). Environmental problems include water and air pollution. Water is
contaminated by leachate, which comes as a result of water percolation through the waste deposit. Air is contaminated through burning of waste particles. Also, solid waste particles that are not properly disposed of serve as breeding sites for insects, promoting air and water-borne diseases (Alam, Chowdhury, Hasan, Karanjit, & Shrestha, 2008).

Diseases such as cholera are contracted as a result of contamination of water by some pathogens (Giusti, 2009). Pathogens are disease-causing agents. Health issues are connected to the practices of handling and disposal of waste. This involves recycling activities and exposure to emissions caused by incineration and the odor from landfills. Exposure to emissions from incinerators is mostly due to inhalation and in case of water, it occurs as a result of consumption of water that is contaminated by leachate (Giusti, 2009). In developing countries, waste is mostly dumped in lowland areas, and there are no imposed regulations for waste disposal. Solid waste may not be separated from infectious and toxic wastes that are harmful to waste scavengers and the environment (Alam et al., 2008).

Specifically, landfills affect human health by causing congenital malformations. Incineration on the other hand increases the risk of developing a group of blood cancer that evolved from lymphocytes known as non-Hodgkin’s lymphomas and sarcomas. It also leads to poor air quality and can cause acid rainfall. Composting of waste as a waste management practice exposed workers to respiratory diseases (Giusti, 2009). None of these methods, though, helped reduce the amount of waste humans keep producing. This led people to think about how to manage waste and if
there was any other way to treat or use waste. This is how the recycling and reuse of waste started (Skinner, 1993).

There are several factors that affect waste management practice. According to (Guerrero, Maas, & Hogland, 2013), there are several factors that affect waste production, separation and management in developing countries. Some of these factors include; lack of knowledge on technologies to use for waste management, lack of equipment, and absence of decision makers. Also, public awareness influences individual behavior towards waste management practices. Knowing the consequences of waste mismanagement to the environment and individual health influence people’s practice of proper waste management (Guerrero et al., 2013). The more environmentally aware an individual is, the more likely he is to properly dispose of household waste, separate toxic from solid waste, avoid littering, and pay for waste management services (Imam, Mohammed, Wilson, & Cheeseman, 2008). Educating people about the importance and significance of waste management increases their level of participation in waste management programs (Nnorom, Ohakwe, & Osibanjo, 2009).

Generally, the condition of waste management practice in developing countries is very critical because it is not considered a priority. Water quality, lack of food, poor education, widespread of diseases are major problems in developing countries that make waste management not a major priority (Giusti, 2009). In contrast, several U.S. cities have already banned the use of packaging materials, particularly plastic bags, as have some countries in Africa, such as Kenya recently in 2017, Morocco in 2016, and Rwanda in 2008. Kenya has severe penalties for violators (BBC, 2017). This is
done in order to reduce the amount of waste generated. Plastic bags are believed to contribute heavily to waste production (Skinner, 1993).

The problem with some of the waste management techniques is not just limited to public health consequences but other financial constraints. Landfilling as a technique needs to be operated on a large scale. This requires financial input mostly from the government. Also, the cost of completely cleaning up a dumpsite is a burden on a nation’s economy. Even though cleaning of dumpsite provides business opportunities between countries, there is a need to identify the environmental consequences and costs of waste management system. The more productive technique to consider for waste management is recycling (Skinner, 1993). It is more reliable than the aforementioned techniques because it involves converting what is considered useless into useful and valuable items (Cooper, 2008).

*Recycling*

Recycling is the environmental reprocessing of disposed waste. Recycling is more than just a way to transform waste to raw materials, but also a way of reusing old materials into new forms through maintenance and repair. Recycling is not just limited to plastic bags and plastic containers. Paper, metals and glass can also be recycled. Recycling is done as a means of reusing items through extending their lives in another useful form. It is considered an easy way to maintain already existing things (Werrett, 2013). Globally, recycling is not done on a large scale. From the 250 million tons of trash that is produced in the United States, only 65 million tons is recycled (United States Environmental Protection Agency, 2010).
In developed countries, recycling involves industrialized activities and is considered as part of the daily life of each citizen. Thus, in these types of countries, research on recycling considers technical applications of models and tools. Socio-economic factors that affect recycling in the developed world include education, income, consumption patterns, gender, and age (Troschinetz & Mihelcic, 2009).

In contrast, developing countries have only few researches that focus on recycling. Most of these few researches were done in China and Mexico. These researches considered belief as one of the factors that influence recycling and other environmental behaviors. This entails the belief and understanding of reasons to recycle. Both Mexico and China are on the transition state to become developed countries. Other factors that influences recycling in developing countries are government policy, a country’s finance, knowledge of solid waste management and land availability (Troschinetz & Mihelcic, 2009). In a similar study that was conducted in 2012 on 22 developing countries from 4 different continents, findings showed that citizens that get information on the benefits of recycling are more likely to recycle waste materials (Guerrero et al., 2013).

Recycling has an advantage to the environment over other waste management techniques. Proponents of recycling opined that using products that are made from recycled materials has a benefit of reducing environmental pollution caused by litter. Another advantage is that recycling preserves biodiversity; by recycling and not using landfills, the land can be used for more productive means rather than just filling it with waste (Black, 1995).
**Consumer preferences toward green products**

Today, most people are concerned about what they use in the environment because they care about the quality of life of future generation (Khan & Mohsin, 2017). This is unlike the way the ancestors have lived (Khan & Mohsin, 2017). For consumers who are concerned with the negative impacts of products on the environment, they consider it a good idea to use “green” or environmentally friendly, products (Bhatia & Jain, 2013). Green products are those that are presumed to be environmentally safe. Most examples of green products are domestic materials that were made from discarded papers or plastics, recyclable packaging materials, cleansers made from biodegradable materials, pollution-free agents and energy-efficient light bulbs (Mainieri, Barnett, Valdero, Unipan, & Oskamp, 1997).

The major concern with the environmental consequences of not using green products is mostly due to climatic factors, environmental degradation, which give rise to global warming and the stratospheric ozone layer depletion. This eventually results to increasing air, land, and water pollution and subsequently the destruction of natural habitats (Khan & Mohsin, 2017). Therefore, using green products has an advantage of making the environment less polluted (Bhatia & Jain, 2013).

Since consumers are becoming more concerned about the consequences of what they consume and use to their health and the environment as well, they are beginning to change their attitudes and behavior towards their food and things they use (Biswa & Roy, 2015; Laroche, Bergeron, & Barbaro-Forleo, 2001). These concerns have increased the demand for products made by environmentally conscious firms. The goal of all sustainable production is to meet the needs of today without affecting the
environment’s ability to meet the needs for future generations (Forbes, Cohen, Cullen, Wratten, & Fountain, 2009). Companies are considering sustainable production as a competitive advantage (Bhaskaran, Polonsky, Cary, & Fernandez, 2006; Forbes et al., 2009; Mollá-Bauzá, Martinez-Carrasco, Martínez-Poveda, & Pérez, 2005).

In a study in New Zealand, environmentally sustainable wine was preferred by 75% of the respondents, whereas 5% of respondents had no preference for sustainably produced wine. According to the results, factors that influence consumer preferences to buying sustainable wine include proper labeling indicating that the wine is produced using environmentally sustainable techniques. Another significant factor are the environmental and health consequences of using the wine. Therefore, production of environmentally sustainable wines may yield a significant benefit in the market (Forbes et al., 2009).

Another study that was carried on women with children who shop regularly in supermarkets in London concluded that 80% of the women are likely to choose products they knew were produced by companies that use environmentally friendly practices. None of the women strongly disagreed when asked if they would choose sustainable products. The results of this study mentioned factors that affected consumer preferences to include trust in products, including exposure and product-marketing communication. Most female respondents in the study trust only well-known brands. Lack of exposure to green products and informing consumers about new and improved products that are environmentally friendly also affect consumer preferences (Pickett-Baker & Ozaki, 2008).
Environmental attitudes and behaviors

Consumer attitudes, beliefs and values need to be considered when identifying factors that influence consumer’s purchase decision. Attitudes generally are the beliefs people have for a particular thing that incline people to behave in a particular way toward that thing (Weigel, 1983, as cited in Mainieri et al., 1997). Consequently, people with positive attitudes toward environmental protection are more likely to support the use of environment-friendly materials. An important finding in the study of Laroche et al. (2001) confirms the relationship between attitudes and willingness to pay for green products. Customers that were willing to buy green products did not profess it as inconvenient to behave in an environmentally favorable manner while the reverse was true for customers that were not willing to buy green products (Laroche et al., 2001).

Demographic factors, such as age, gender, ethnicity, and educational status, may contribute to environmental attitudes and behavior. Traditionally, people that are young, well-educated, wealthy and based in cities were considered as the group that are more concerned about environment-related issues (Arbuthnot, 1977). This is not the case today. Today, women are more likely to be environmental advocates than men (Mainieri et al., 1997). This is because women are more likely to do most of the shopping for a household, which may make them more aware of environmentally friendly products. Women also recycle and participate in environmental issues more than men (Mainieri et al., 1997). Education and income may also be positively or negatively correlated with environmental attitudes. Therefore, depending on the society, demographics may not be great predictors of environmental concern and behavior (Mainieri et al., 1997).
In developing countries, environmental attitudes are considered a major factor to
determine consumer perception on sustainable products and attitudes toward a green
lifestyle. For example, in Nigeria, research concluded that willingness to participate
in e-waste recycling was dependent on environmental awareness, individual concern
about the environment, and willingness to support efforts to control environmental
deterioration (Nnorom et al., 2009). Thus, for developing countries where
environmental awareness may be low, the willingness of people to pay for waste
management and green products is considered low compared to their willingness to
pay for electricity and water bills (Nnorom et al., 2009).

Factors that affect purchase decision
Most studies have shown support for environmental protection, but it is yet to be
concluded how much the public are willing to pay for the improvement of the 
environment. Consumers may be price-sensitive when it comes to buying more-
expensive green products, despite their environmental concern (Mainieri et al.,
1997). One of such studies concluded that among the 74% of the consumers that
preferred environmental protection to economic growth, only few of them
participated in environmental protection behaviors such as the recycling of bottles,
cans, and newspapers. About 75% of the consumers claimed to pay more for green
products, but only 14% of them bought products made from recycled materials.
Despite their pro-environment concern, again only 16% of the consumers avoided
companies that are considered anti-environment (Mainieri et al., 1997). Though
many people claim to be environmentally concerned, their actions toward the
environment may not support their convictions.
The major concern is that what most people say they are willing to pay for to buy recycled products will not be the same with what they end up paying for. Therefore, there is a need to better understand other factors that influence consumer buying behavior (Hamzaoui Essoussi & Linton, 2010).

According to the study conducted by Laroche et al. (2001) in a large North-American city, several factors contributed to the resident’s willingness to buy and pay more for sustainable products. The factors include demographics, environmental literacy, values, behaviors, and attitudes toward environmental issues. In this study, the most influential factors were demographics; specifically gender, marital status, and number of children. Married women with at least one child were more likely to pay more for sustainable products. This result may be attributed to the fact that women are more environmentally conscious than men. Their marital status also contributed because of their thought of how a ruined environment will affect their partners and children (Laroche et al., 2001).

Another important factor that influences purchase decision of green products is environmental awareness. Environmental awareness is important to consumer’s determination of what product to buy. This can be seen in the result of a study where absence of information about a remanufactured camera made participants value it less than its substitutes. The introduction of the environmental information about the remanufacturing process and environmental characteristics of the remanufactured camera as opposed to a conventional one, made the participants boycott the conventional camera and accept the remanufactured one. Even with the debriefing about the products, people were concerned about its quality as a remanufactured
product. Therefore, quality and price are two other main factors that affect consumer’s purchase decision. The challenge is for companies that make green products to consider high quality standards for their products. Accordingly, there should be proper labelling to enable consumers to know what product they are buying (Michaud & Llerena, 2010).

Consumers & green products in developing countries and Nigeria

There is a global concern in the population growth rate. This is because a growing population is always followed by growing needs. In developing countries, population growth rate has increased significantly. As the population continues to increase, there is a need to create new and big markets for products. Unlike in developed countries, people in developing countries are not aware of environmental problems and do not show concern for it (Yadav & Pathak, 2014).

In India, a study was conducted in 2013 on consumer perception toward green products. The result showed that consumers have a positive attitude towards green products but they are more concerned about the price and availability of such products. It was found that only a small percentage of people buy green products. It was then concluded that if marketers make consumers aware of the benefits of green products, consumers will be willing to pay more for green products than other traditional products (Bhatia & Jain, 2013).

Nigeria has the largest human population of any African country; thus, it represents a large and growing market for consumer goods. The country also suffers from widespread pollution and environmental degradation. The Nigerian government has
adopted sustainable development as part of the United Nations’ Sustainable Development Goals, which were launched at an international summit in 2015. Within Nigeria, businesses and organizations may promote sustainability in their own ways.

For example, in northeastern Nigeria, the American University of Nigeria (AUN), a private university, is involved in several projects promoting sustainability as part of its mission as Africa’s development university. In 2012, AUN became the first member from sub-Saharan Africa of the Association for the Advancement of Sustainability in Higher Education (AASHE). That same year the AUN Sustainability Office was established. The Office of Sustainability built nature trails, developed bottle-brick construction projects, planted trees, taught sustainable farming to poor rural farmers, and runs two programs that turn waste materials into consumer products while simultaneously supporting local women in the community.

Established in 2013, the first of these programs, called Waste-to-Wealth, helps women learn how to clean and sew products, such as handbags and floor mats, from used plastic bags, thus helping clean the environment while giving local women a source of income (AUN Office of Sustainability, 2013). In 2015, the second program, Creating-with-Threads, was established. In this program women use discarded materials from tailors to make products such as floor rugs, computer bags, and makeup cases (AUN Office of Sustainability, 2015).

Products made through these programs have been sold at exhibitions in Nigeria’s Federal Capital Territory, Abuja. The Sustainability Office also regularly organizes sales exhibitions at AUN to draw the attention of customers. However, the AUN
Sustainability Office is challenged to market these products to the wider Nigerian public, to help create more income for local women manufacturers and bring more women into the program.

Therefore, I investigated the Nigerian public’s perception of and willingness to buy products made from the Waste to Wealth program. I focused on the city region of Yola-Jimeta, Adamawa State, in northeastern Nigeria, where AUN is located. My aim was to identify factors, such as demographics, that may influence people’s interest in and willingness to buy these locally made green products. I also aimed to identify whether increased environmental awareness influences the public’s perceptions and willingness to buy the products.
HYPOTHESES

Null Hypothesis: Environmental awareness has no effect on people’s perceptions and willingness to buy products made from recycled materials.

Alternative hypothesis: Environmental awareness influences people’s perceptions and willingness to buy products made from recycled materials.

AIMS & OBJECTIVES

Aims:

- To assess public perception of, and willingness to buy, products made from recycled materials in Yola-Jimeta, northeastern Nigeria.
- To inform study respondents about the importance of products made from recycled materials.

Objectives:

- To identify demographic factors that influence public acceptance and willingness to buy products made from recycled materials.
- To assess how much people are willing to pay for products made from recycled materials.
- To determine which, if any, of the products are attractive to respondents.
- To inform the respondents about the AUN-made recycled products.
- To evaluate if respondents who held negative opinions of products made from recycled materials think differently after receiving information on the recycled products made in AUN.
- To share my findings with the AUN Sustainability office.
CHAPTER 2
MATERIALS & METHODS

Study Site

I conducted this study in the Yola-Jimeta area of Adamawa State in the northeastern part of Nigeria. Yola-Jimeta is located on the Benue River. Adamawa State has high unemployment and illiteracy rates (NPC & ICF, 2014).

Yola is the capital city of Adamawa and is primarily divided into two parts – Yola and Jimeta (Figure 3). The old Yola, also called Yola town, is the traditional city where the traditional leader (Lamido) resides. There is a mini market in Yola town and other small shops and supermarkets. The American University of Nigeria is also located in Yola town. The newer city of Jimeta is the commercial and administrative center of the state and location of the central market, known as Jimeta Modern Market.

Sampling

I conducted this study in the spring of 2018. To collect data on public perceptions and willingness to buy products made from recycled materials, I used targeted sampling. Targeted sampling is a method that involves intentional selection of subjects who are most relevant to the study (Newing, 2011). I interviewed shoppers at four sites in Jimeta: three supermarkets (Yakubu Shopping Plaza, Luka Memorial Stores, and Zahra Foods Store) and the Jimeta Modern Market.
My sampling unit was an individual adult customer (≥18 years old) who shops in the markets and/or the selected shopping malls within Jimeta. The interview was conducted after an informed consent process. The total sample size for this study was 175 (n = 50, Zahra Foods Store; n = 50, Luka Memorial Store; n = 50, Jimeta Modern Market; and n = 25, Yakubu Shopping Mall).
Data Collection

I used a structured questionnaire with both closed and open-ended questions (Appendix I). I conducted a pilot test of the questionnaire in Yola market with 17 respondents. Most of the questionnaires were self-administered by the respondents, and I assisted some respondents who had trouble with reading or writing.

The questionnaire was divided into four parts. Part one covered demographic data: gender, age, marital status, level of education, and personal and household income. Part two included a respondent’s awareness of and concern for environmental and social issues, such as waste disposal, air and water pollution, population growth, social instability, economic growth, and the educational system in Nigeria. Respondents were also asked about their willingness to buy more expensive, environmentally friendly products over similar, less expensive products that were not environmentally friendly.

Part three focused on consumer preferences. Respondents assessed three products made and sold through AUN’s Waste-to-Wealth program: a bag, basket, and a mat (Appendix II). Made from plastic bag waste, the three items were labeled and displayed on a table. In part four, I showed respondents an informational flyer (Appendix III) with information, including photos, on how the products were made and benefits provided by the Waste-to-Wealth program to the environment and local women. After, I asked the respondents whether the information made them more willing to buy and pay more for these products.
Data Analysis

I used the IBM Statistical Package for the Social Sciences (SPSS) to analyze my data. Descriptive statistics were used to define my study population, and cross-tabulations and $\chi^2$ tests were used to test for significant relationships among measured variables. To account for sample size, I recoded some categorical variables into fewer categories, such as recoding education level into two groups – essentially, higher education and lower or no education. This was also done for one question using a Likert scale. Willingness-to-buy a more expensive, environmentally friendly good over a less expensive good was recoded into two categories: weak willingness-to-buy (which included the responses not at all likely, slightly likely, and moderately likely) and strong willingness-to-buy (which included the responses very likely and extremely likely).

For statistical analysis, respondents’ answers relating to how concerned respondents were regarding five environmental topics were grouped, based on natural breaks in the data, into an “index of environmental concern”: low, medium, and high concern. Scores ranged from a minimum possible score of 7 to a maximum possible score of 25. Respondents who scored between 7 and 18 were classified as low, 19 to 21 as medium, and 22 to 25 as high.

Lastly, I used logistic regression to model the effect of demographic variables on respondents’ willingness to buy recycled, more costly products over less costly products. For this model, I used a forward-stepwise approach using likelihood-ratio statistics for variable selection.
Ethical Guidelines

Before the research, I completed the “Protecting Human Research Participants” online training by the U.S. National Institutes of Health Office of Extramural Research (Certification Number: 2550422) (Appendix IV). This study was also approved by the AUN Institutional Review Board (IRB approval code: AUN-18-01-02). Finally, I obtained prior permission from the managers of Zahra Foods Store, Luka Memorial Store, and Yakubu Shopping Mall and from two shop owners in Jimeta Modern Market to conduct research at or near their premises.
CHAPTER 3
RESULTS

Description of Respondents

Of the 175 respondents, the mean age was 32.14 years (SD = 9.7, range = 18-60). Most respondents were male (125; 71.4%) and married (99; 56.6%). The remaining participants were single (74; 42.3%) or widowed (2; 1.1%). Only a few had primary school certificates as their highest educational qualification (11; 6.3%); others had secondary school certificates (39; 22.3%), diploma and NCE certificates (50; 28.6%), or a Bachelor’s degree (52; 29.7) or post-graduate degree (19; 10.9%). Very few had no certificate (4; 2.3%).

Slightly more than one-half of respondents earned a personal monthly income below 50,000 Naira (91; 52%); others said they earned more than 50,000 Naira monthly (69; 39.4%), and the remaining 15 respondents (8.6%) were unsure of their personal monthly income. For those who reported average household monthly income, the mean was 212,890 Naira (SD = 460,900, range = 10,000-4,000,000, n = 170).

Environmental Concern and Awareness

Respondents were asked about their level of concern regarding environmental and social issues in Nigeria on a scale of 1 to 5 (Likert scale). The environmental concerns included waste disposal, air pollution, water pollution, climate change, and human population growth. Social issues were social instability (such as kidnappings and terrorism), public health, economic growth and job creation, and the educational system in Nigeria.
In general, respondents showed high levels of concern for most of these issues, with the country’s educational system being of greatest concern and human population growth being the lowest (Figure 4). I added the Likert scores for the five environmental issues for each respondent into one overall score. Minimum possible score overall was 5, and the maximum was 25. The mean score across all environmental issues was 19.5 (SD = 3.86, range = 7-25).

Factors influencing buying preferences of environmentally friendly products

In addition to evaluating respondents’ level of environmental and social concern, I investigated whether respondents were willing to buy more expensive,
environmentally friendly products over similar, yet less costly, products, as well as factors that might influence this decision. Both individual cross-tabulations and logistic regression modelling showed household income as the only important predictor of respondents’ willingness to buy environmentally friendly products over less costly, similar products (Tables 1 and 2). There was no noticeable effect due to gender, age, marital status, level of environmental concern, or education (Table 1). Likelihood-ratio estimates of logistic regression parameters show a positive effect of household income on likelihood to pay more for environmentally friendly products (Table 2, Figure 5).

**Table 1.** Relationship between predictor variables measured in this study and the willingness to buy environmentally friendly, more costly products over the less expensive ones.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Test statistic</th>
<th>df</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>2.056</td>
<td>1</td>
<td>.152</td>
</tr>
<tr>
<td>Age in years</td>
<td>.025</td>
<td>1</td>
<td>.875</td>
</tr>
<tr>
<td>Marital status</td>
<td>4.210</td>
<td>2</td>
<td>.122</td>
</tr>
<tr>
<td>Level of Environmental concern</td>
<td>1.184</td>
<td>2</td>
<td>.553</td>
</tr>
<tr>
<td>Education</td>
<td>.084</td>
<td>1</td>
<td>.772</td>
</tr>
<tr>
<td>Average household monthly income</td>
<td>3.897</td>
<td>1</td>
<td>.048</td>
</tr>
</tbody>
</table>

(per 10,000 Naira)

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>SE</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp (β)</th>
<th>95% C.I. for EXP (β)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average household monthly income</td>
<td>.024</td>
<td>.012</td>
<td>4.191</td>
<td>1</td>
<td>.041</td>
<td>1.024</td>
<td>1.001 – 1.048</td>
</tr>
</tbody>
</table>

(per 10,000 Naira)
Consumer Preferences

The three Waste-to-Wealth products were analyzed based on whether a respondent 1) liked a product, 2) was willing to buy it and for how much, and 3) would recommend the product to others (Figure 6). Respondents were generally very receptive toward the products, and most preferred the mat (Item C) over the two others (Figure 7). Of the 162 respondents who were willing to buy the bag (Item A), they said they would pay between 200 and 20,000 Naira (mean = 2,419.75, SD = 2,653.78). Respondents would pay an average of 2,753.42 Naira (SD = 2,850.26, range = 300-25,000, n = 161) for the basket (Item B), and an average of 4,135.84 Naira (SD = 4,355.36, range = 500-30,000, n = 166) for the mat (Item C).

![Likert-scale answers to the question: “How likely are you to buy a more costly product if this product’s packing or materials are more environmentally friendly than a competitor’s product?” were significantly influenced by income. Here, frequencies for the five Likert options are shown against sum values for reported average monthly household income.](image-url)
Figure 6. Consumer preferences for the three items with regards to whether the respondents like it, whether they are willing to buy it and whether they will recommend it to someone. Item A stands for bag, Item B stands for basket and Item C stands for mat.
Effect of educational information

Almost all the respondents (163, 93.1%) noted that they were more willing to buy the products after reviewing the informational flyer. Eighty-seven (53%) of the respondents attributed this to learning about the amount of pollution caused by plastic bags. Seventy-eight (47%) explained they were more willing to buy because making the products created job and livelihood opportunities for local women. A few remarked on the creative aspect of the Waste-to-Wealth products and that it was positive to promote recycling. Some said they find the products captivating, and the Waste-to-Wealth program is a good initiative. For example, one male respondent of 30 years said:

“I will buy the product because it will provide a source of income to the women that are involved in transforming the waste into a reusable commodity and it will reduce environmental pollution”
Only four (2.3%) of the total respondents said they were not more willing to buy the products after reading the educational flyer. This was attributed to lack of funds to afford the products, while one respondent noted that the women in this program cannot rely solely on the program to cater to their needs. The remaining eight respondents (4.6%) said they might be more willing to buy or were unsure. They explained that this depended on their income and the selling price and was not based on the information provided about the Waste-to-Wealth program and its products and the environmental impact of plastic-bag use.

However, of the 163 respondents who said they are more willing to buy the products after reviewing the educational flyer, less than one-half of them (80, 49.1%) were willing to pay more than the prices they noted before reviewing the informational flyer. Ten (12.5%) of these 80 respondents said they would pay more because the items are locally made and paying more will add value to the products. Another 10 (12.5%) respondents were willing to pay more because they now knew the women spend time making the products. Six (7.5%) respondents noted that buying the products will encourage the work of the women and boost their zeal for more production of recycled goods. Another six (7.5%) said they would buy the products no matter the price because they like them. Five (6.3%) said they were willing to pay more because the products are attractive and of good quality. For example, one female respondent of 30 years said:

“I will still buy it because I like the product and it is a new initiative. And no matter what it will be cheaper than the previously known products”
In contrast, 66 (40.5%) of the respondents who were more willing to buy the products after reading the educational flyer said they would not pay more than the given prices. Twenty-four (36.4%) of them said this was because the prices they previously mentioned were adequate and because the plastic bags were not bought, but collected as trash. For example, one of the respondents, a female of 25 years said:

“I think making the recycled materials expensive is not proper since their source is known (waste). It should be affordable to encourage people to buy.”

The remaining 17 (10.4%) respondents, despite their more willingness to buy the products after reviewing the educational flyer, were unsure whether they will pay more than the prices they mentioned or not. Their reasons included uncertainty about product quality and durability; they did not know the extent of work done by the producers. Or, they may only pay more depending on the size of and need for the product.
CHAPTER 4
DISCUSSION

In this study, I tested the hypothesis that increased environmental awareness will make Nigerian shoppers more willing to buy products made from recycled waste materials. My findings showed support for this hypothesis. However, they also showed that this increased support did not necessarily translate into greater willingness to pay more for such products. Household income was the only predictor variable that significantly influenced decision-making by shoppers in this study; there was a positive relationship between household income and willingness to buy more expensive, yet environmentally friendly products. Therefore, although increased environmental awareness did influence shoppers, such awareness may not be enough to overcome financial obstacles. I will discuss these findings and then conclude by discussing the limitations of this study and presenting recommendations for the American University of Nigeria’s Sustainability program.

Respondents showed higher level of concern towards social issues like educational system, social instability and economic growth than other environmental issues such as pollution and population growth. Educational system in Nigeria received the highest level of concern. Social instability, as expected, also had a high level of concern. This is likely due to the fact that the study sites are located in Adamawa State in northeastern Nigeria. This region has been affected by terrorism and Boko Haram insurgencies than any other region in Nigeria (Okoli & Iortyer, 2014).

Respondents showed more concern for waste disposal than any other environmental issue. Waste management is poor in Yola, like other parts of northern Nigeria, which
made it a very important issue (Imam et al., 2008). Water and air pollution were also a major concern to respondents. Most of them, when asked about water pollution, commented that the water is so scarce to be seen polluted. Human population growth received the lowest concern from respondents. Most of them were attributing it to religious and cultural beliefs; they believe that population does not matter and it should not be considered a concern like other environmental issues.

Overall, respondents had a high level of environmental concern because the average index value was almost 20 on a scale of 5-25. This explains why respondents were keen to buy these products. The result of a similar study that was conducted in India also showed high level of environmental concern among respondents (Yadav & Pathak, 2014).

Household income was found to play an important role in influencing customer’s buying decision of products that are made from recycled waste materials. Respondents from wealthier families were more likely to buy recycled, environmentally friendly products over less costly similar products while those from low income families were less likely to buy recycled products because their prices were higher. This can be supported by the result of a similar study that was conducted in Spain on costly organic wine over similar conventional and less expensive wine. It was found that those that were willing to pay more for organic wine, which is 25% higher than the conventional one, were people from the high income level families. Similarly, people with low purchasing power proposed to pay less for the organic wine (Mollá-Bauzá et al., 2005).
There is a positive effect of educational information given to customers on their willingness to buy recycled products. The result of this study showed that almost all the respondents (93.1%) were more willing to buy the products after reviewing the information about the products. This supported my hypothesis that increased environmental awareness influences customers’ willingness to buy products that are made from recycled waste materials. This is similar to the findings of a study where introduction of the environmental information about the remanufacturing process and environmental characteristics of a remanufactured camera made the participants accept the remanufactured ones (Michaud & Llerena, 2010). Another study concluded that customers were willing to buy recycled products when marketers clearly inform them about the benefits of using environmentally friendly products (Bhatia & Jain, 2013).

Respondents were environmentally concerned and aware of other environmental consequences but were still not willing to pay more for recycled products. A similar study showed that customers might be environmentally concerned and at the same time price-sensitive for certain green products (Mainieri et al., 1997). Therefore, there was no noticeable relationship between consumers’ environmental concern and willingness to pay more for recycled products. In another study, almost all the female respondents showed concern towards environmental issues but only 50% of them were willing to pay more for environmentally friendly products (Yadav & Pathak, 2014).

Pricing is very important when considering customer’s buying decision. Results from similar studies have shown price as an important predictor of customer’s willingness
to buy recycled products (Biswas & Roy, 2015; Khan & Mohsin, 2017). The prices for the three products were given by the respondents considering their need for them and the product’s size. The mat was priced the highest by the respondents as they considered it to have higher cost of production (plastic bags) than the other two. Some respondents priced the bag and the basket almost the same because they considered the two of the same use. Also, it was only for the mat that respondents were less price-sensitive because they liked it the most. The result of a similar study showed that customer’s willingness to buy and pay more for recycled products can be product-specific depending on their need for the product (Hamzaoui Essoussi & Linton, 2010). Most of the respondents who liked the bag and the basket, said they will only buy it if the price is right for them. Interestingly, there was a huge gap between prices given by respondents for each product. For example, some of the respondents priced the bag at 200 Naira while others priced it at 20,000 Naira, depending on their preferences. This shows the economic difference between the rich and the poor in this region.

Limitations and challenges

The major limitation to this study was the sample size. A larger sample size would have allowed me to better understand customers’ buying preferences. Also, a larger sample may have included individuals who were less concerned about environmental or social issues as those in this study. If so, the effect of education could have been more distinctly determined.

Some respondents might not have been honest in some answers because most of them panicked when they learnt, from the informed consent that I am from American
University of Nigeria. Some even rejected to participate because of that. I had to keep reminding them that there is no correct answer, and they should not answer to impress me. Most people were more sensitive about questions like age, income, and how much they are willing to buy the products. Respondents also wanted to know how much the products cost before saying how much they themselves would pay.

Another challenge was the time it took to administer the questionnaire. Most respondents were in a hurry and were not willing to spend much time doing this for free. I had situations where people started and did not complete because they were in haste, and I had to discard these interviews.

Recommendations to AUN’s Sustainability Program

Most of the respondents preferred the mat to the basket and the bag. The mat, unlike the other two, was considered by most of the respondents as more useful in many places and for both genders. Some of them commented that the mat can be used both indoors and outdoors. The basket was ranked the third most preferred by the respondents. Most of them commented that the basket can be used for shopping and conveying food to the hospital. The bag and basket were considered feminine. Consequently, most of those that responded they will not buy the bag and the basket mentioned it is because they cannot use it themselves unless they are buying for someone.

I recommend that subsequent exhibitions should adopt the use of educational posters that will include information about the recycling program and how the products were made. Any educational program or marketing campaign regarding Waste-to-Wealth
products should emphasize how long it takes to make each of the products. Some of the respondents wanted to know the production duration before pricing the products; they believe that the time invested reflects the amount of work that goes into each of these hand-made products. This might further encourage shoppers to buy these products.

The Sustainability Office should consider the price issue because overall, people liked the products and were willing to buy. Since the residents of Yola are low income people, the price should be affordable to encourage more buyers. I recommend that more products that can be used in our homes should be made because respondents were happy to know about the recycled products. Finally, the recycling program should be initiated in other parts of the country to reduce the ever-growing pollution and provide job opportunities for local people.
CHAPTER 5
CONCLUSION
This research assessed the public perceptions of, and willingness to buy products that are made from recycled plastic bags in Yola-Jimeta, northeastern Nigeria. Most of the respondents were seeing such recycled products for the first time and complimented its art of innovation. Majority of the respondents liked the products and were willing to buy them. Household income was the only statistically significant variable. People from wealthier families were more likely to buy recycled products than those from low income families. Other variables like age, gender, education and marital status did not show relationship with willingness to buy recycled products. Increased environmental awareness made people more willing to buy the recycled products but people were still not willing to pay more for the products. In order to create more market for this program, pricing should be considered and made affordable to residents of Yola-Jimeta, northeastern Nigeria. Lastly, awareness need to be raised on the significance of using recycled products. The findings from this study supported my hypothesis that increased environmental awareness influences people's willingness to buy recycled products.
APPENDIX I

Date: __________________________ Location: □ JIMETA MARKET
Respondent number: ____________ □ YAKUBU STORE
                                      □ LUKA STORE
                                      □ ZARA FROZEN FOODS

PART I DEMOGRAPHIC DATA

1. What is your gender?
   □ Male      □ Female

2. What is your age (in years)?: ____________

3. What is your current marital status?
   □ Single    □ Married    □ Divorced
   □ Widowed

4. What level of education did you successfully complete?
   □ Primary school certificate    □ Secondary school certificate
   □ Diploma/NCE                  □ Bachelor’s degree (BA/BSc)
   □ Post graduate/tertiary       □ No certificate/degree

5. On average, what is your personal monthly income in Naira?
   □ ≤ 18,000 (18,000 or less)
   □ 18,001 to 50,000
   □ > 50,000 (more than 50,000)
   □ Don’t know

6. On average, what is your household’s monthly income in Naira (for all members of your household)?

                                      ____________
### PART II. ENVIRONMENTAL AWARENESS & CONCERN

7. Please indicate how CONCERNED you are regarding each of the following issues in Nigeria. (PLEASE CIRCLE ONE NUMBER ON EACH LINE)

<table>
<thead>
<tr>
<th>Issue</th>
<th>Not at all concerned</th>
<th>Slightly concerned</th>
<th>Moderately concerned</th>
<th>Very concerned</th>
<th>Extremely concerned</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Waste/rubbish disposal</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>b) Water pollution</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>c) Air pollution</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>d) Climate change</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>e) Human population growth</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>f) Social instability (e.g., kidnappings, terrorism)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>g) Public health (spread of disease, etc.)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>h) Economic growth and job creation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>i) Educational system</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

8. You go to the store to buy something. There are two options for the product you need. They are identical except that one of the products is made from recycled or reused materials, so it is “environmentally friendly.” However, it is more expensive. How likely are you to buy the more costly, environmentally friendly product over the less expensive product? (PLEASE CIRCLE ONE NUMBER)

<table>
<thead>
<tr>
<th>Likelihood</th>
<th>Not at all likely</th>
<th>Slightly likely</th>
<th>Moderately likely</th>
<th>Very likely</th>
<th>Extremely likely</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
PART III. CONSUMER PREFERENCES

INSTRUCTIONS: Please study the items on display lettered A to C. These products are made from discarded plastic bags. Next, please answer the below questions for each item.

ITEM A (BAG) (PLEASE TICK ONLY ONE ANSWER FOR EACH QUESTION BELOW)

9. Do you like this item?
   □ Yes □ No □ Not sure

10. Would you buy it?
    □ Yes □ No □ Depends on the cost

11. If you answered “YES” or “DEPENDS ON COST” to the above question, how much would you be willing to pay for it in Naira?

12. Would you recommend this product to others?
    □ Yes □ No □ Not sure/maybe

ITEM B (BASKET) (PLEASE TICK ONLY ONE ANSWER FOR EACH QUESTION BELOW)

13. Do you like this item?
    □ Yes □ No □ Not sure

14. Would you buy it?
    □ Yes □ No □ Depends on the cost

15. If you answered “YES” or “DEPENDS ON COST” to the above question, how much would you be willing to pay for it in Naira?

16. Would you recommend this product to others?
    □ Yes □ No □ Not sure/maybe
ITEM C (MAT) (PLEASE TICK ONLY ONE ANSWER FOR EACH QUESTION BELOW)

17. Do you like this item?
   [ ] Yes        [ ] No        [ ] Not sure

18. Would you buy it?
   [ ] Yes        [ ] No        [ ] Depends on the cost

19. If you answered “YES” or “DEPENDS ON COST” to the above question, how much would you be willing to pay for it in Naira?

____________________________________________________

20. Would you recommend this product to others?
   [ ] Yes        [ ] No        [ ] Not sure/maybe

21. Please rank these three products from 1 to 3, in order of your personal preference, not considering their cost. Enter a number next to the item name, with 1 = MOST PREFERRED and 3 = LEAST PREFERRED.

ITEM A (bag): ______________________
ITEM B (basket): ______________________
ITEM C (mat): ______________________
PART IV. INFORMATIONAL FLYER

INSTRUCTIONS: PLEASE REVIEW THE INFORMATIONAL POSTER PROVIDED TO YOU. THEN PLEASE ANSWER THE BELOW QUESTIONS.

22. After reviewing this information, would you be more willing to buy any of these three products?

☐ Yes
☐ No
☐ Don’t know/maybe

23. Please explain your answer:__________________________________________

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

24. After reviewing this information, would you be willing to pay more than you previously noted for any of the three products?

☐ Yes
☐ No
☐ Don’t know/maybe

25. Please explain your answer:__________________________________________

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

Thank you for your time and participation!
APPENDIX II
APPENDIX III

These three products were made by local women as part of a program called “Waste to Wealth” at the American University of Nigeria.

- The materials used are discarded (waste) plastic bags.
- Local women gather and clean the plastic bags.
- They undergo training to learn how to weave the plastic bags into decorative or useful items, such as handbags and other products.
- These products are sold and provide a source of income for local women.
- The plastic bags would otherwise become pollution in the environment.
- Each year, about 500 billion plastic bags are used worldwide. More than 1 million bags are used every minute.
- Many are discarded after even a single use, increasing the amount of pollution on land, in rivers, and in the oceans.
Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that Bilksu Ahmad successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 11/03/2017.

Certification Number: 2550422.
REFERENCES


