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Upcycling Textiles for Charity

An Interactive Qualifying Project  
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Report Submitted to:  
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Another person I would like to thank is Ruth McKeogh as she assisted me with the IRB Application.

## Abstract

The objective of this project was to assess the receptivity of people changing from using plastic or paper bags to ones made of cloth in the Worcester area. Plastic usage is a growing concern across the world and is a main contributor to the pollution crisis. Plastic pollution wreaks havoc on the environment and creates dangerous chemicals to people and animals alike. There are numerous other reasons to make this change as they will be explained later in detail and this project aims to determine the likelihood of people from varying age ranges to make this change. The methods used to obtain the information found throughout this paper were obtained via articles from the internet and created and given surveys and interviews.

## Executive Summary

It has never been more important to move away from plastic products and search for alternatives. This project aimed to tackle this problem by researching the receptivity of people in the Worcester area of switching to reusable cloth shopping bags. That is the goal of this project.

There is a nationwide issue regarding excess plastic waste. Much of this plastic waste originates from single-use plastic grocery bags. Such bags have a small lifespan for carrying needs when compared to our proposed alternative, reusable cloth shopping bags. Furthermore, many cities and states have taken initiative to stop or slow the use of single-use plastic grocery bags. Cities like Boston and Chicago have placed bans on these bags and are enforced with hefty fines.

Cloth bags provide many significant benefits over their plastic cousins. Cloth bags last longer and can be washed. Buying and reusing a cloth shopping bag would save a customer money in the long term as they are relatively cheap. This combined with how many grocery stores are either not providing plastic bags anymore or charging a 5 cent fee per bag is favorable for customers to consider a potential change to cloth shopping bags.

In order to learn more information regarding the potential customer acceptance of reusable cloth shopping bags, we created a plan for research. It was imperative to understand two main topics; how much an average customer from Worcester county would pay for a reusable bag, and the current usage of plastic shopping bags. For the former main topic, we created a survey in which we asked 50 people to anonymously answer brief questions to further understand potential price points for the purchase of cloth shopping bags. For the latter topic, we

designed a structured interview for two local grocery stores to learn more about their customer's trends.

Once the results from the survey and interview, the information was analyzed and made clear. The survey showed that people are extremely interested and willing to spend money on plastic shopping bag alternatives. The results were more pronounced when the questions from the surveys were asked again but in favor for the cloth bag proceeds going towards local charities. The interviews proved to be helpful as well. The grocery store managers demonstrated a substantial understanding of their customer's trends and habits. The findings from each method of research provided a necessary foundation for future projects.

People are willing to change from traditional plastic and paper shopping bags to reusable ones made from cloth. As the world is slowly realizing the harmful effects of industry's mass production of plastic, companies and people are looking for long-term alternatives. With the conclusion of this project, I hope to have casted a spotlight onto the possibility of reusable cloth shopping bags to fill the void that will be made larger in the coming years and decades.

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## **Chapter 1- Introduction**

Across the United States, cities both small and large are struggling to create minimal trash especially due to excess plastic grocery bags. Plastic bags found at the grocery store are made from a plastic known as High-Density Polyethylene (Bahrainy, 2018). This type of plastic is thicker than most other types and can be recycled. We see too often that these bags tear, and often forcing cashiers to double-bag a customer's groceries. While 90% of Americans claim to reuse them at least once, there's still much more room for improvement (American Plastics Council, n.d.). Some examples of ways these bags are reused would be to line trash bins, as well as packing lunches. When thrown away or after they receive that last use plastic bags start their long decomposing process. Plastic bags can take up to 1000 years with a minimum of 10 years to break down and decompose (LeBlanc, 2019).

Additionally, many people and communities have begun using alternatives to plastic for their grocery needs. The plastic grocery bags we've all become accustomed to seeing have a limited lifespan of around 12 minutes of consumer use in the U.S as of 2014 (Polka, 2018). A much less common but far more effective method of carrying a person's groceries is with the use of a cloth grocery bag. Cloth shopping bags are more durable and do not rip as opposed to their plastic counterpart. Grocery bags made from cloth have the benefit of being able to be washed and cleaned. A new development in the grocery bag market is with the use of recycling old plastic by collecting, melting and shaping the raw plastics material into a yarn-like material to then be woven into a reusable plastic-woven shopping bag that is 100% recyclable.

Several cities have taken note of the problems that plastic is causing in the environment and how hard it is to get rid of plastic bags. Because of this, these cities have placed bans on



plastic. Some of these cities include Boston, Massachusetts, Los Angeles, California, Chicago, Illinois, and several others. Statewide bans of plastic bags are even taking effect in states such as Oregon, Maine, New York, and many others. To help reduce the use of plastic and ensure the plastic ban becomes permanent, cities and state legislatures have come up with ways to penalize or punish those using plastic. This is largely due to plastics' harmful effects on the environment. Cities and states have decided to charge fees to those still using plastic. Together with a large grocery bill, citizens will have to pay for each plastic bag they are wanting to use. States like California hold civil penalties for those who go against the plastic ban. In order to see the effectiveness of the plastic ban, California had grocery store employees tally what type of bag its customers were using. What was found was that the ban was reducing the pounds of plastic waste by 40 million (Taylor, 2019).

The goal of this project was to assess the receptivity of changing to cloth bags at two different stores in the Worcester area. To accomplish this, I focused on two main points. First, I researched the plastic bag use in each of the two stores. Then, I began to understand the consumer perspective further by surveying WPI students as to their willingness to pay 5 cents, 25 cents, 50 cents, and 1 dollar to get cloth bags vs plastic bags.

## **Chapter 2- Background**

The following represents the current understanding of the use of plastic vs cloth bags needed to provide the foundation for this project.

### **2.1 Cities That Eliminated Plastic Bags**

It is becoming a trend across the entire United States for legislatures to ban the use and sale of plastic shopping bags. Many state legislatures have even passed laws to ban the use and sale of plastic shopping bags across whole states. Some of these states include California and New York among many others. Many notable cities have either banned the use of plastic bags or at least enforce a fee on top of the customer's bill for a person that takes a bag in one of these cities.

On December 14, 2018, the city of Boston began to enforce its plastic bag ban ordinance ("Boston Plastic Bag Ban", n.d.). The bag ban in Boston forces retailers to charge a fee of five cents per checkout bag used by each customer and be kept by the retailer. The ban applies to all retail establishments and affected stores can only provide customers with reusable bags, recyclable paper bags, and compostable bags ("Understanding the Plastic", 2020.) Each type of bag listed each has strict guidelines as well including paper bags must be 100% recyclable, reusable bags must have a thickness of 3 millimeters for the entire bag and compostable bags must be certified to the ASTM D6400 standard.

More than 120 other towns and cities in the state of Massachusetts have passed and enforced their own plastic bag ban and right here in Worcester will be no exception as of April

1st, 2020 (Kotsopoulos, 2019). The aim of this ban on plastic bags is to eliminate street litter, protect marine ecosystems and to reduce greenhouse gasses and solid waste. Unlike in Boston, plastic bags will be forbidden from being provided by retailers. Worcester's take on the plastic bag ban is to enforce substantial fines to those who fail to oblige by the law. Starting on July 1st, a person's first offense will be met with a 50-dollar fine and each subsequent offense will be met with a \$100 dollar fine.

Another notable city that has banned the use of single-use plastic bags is Seattle. As of July 1st, 2012, the city of Seattle has no longer allowed retailers to give their customers such bags but instead can give customers with recyclable paper bags and reusable carryout bags ("Bag Requirements"). The city requires its stores to charge a 5-cent fee for each large paper bag (882 cubic inches) but allows stores to charge additional money on smaller bags as well at their discretion ("Bag Requirements", n.d.). In the city of Seattle, failing to follow this law is met with a \$250 fine but since the bill's passing, no business has had to be fined the citation as in the words of Sego Jackson, "there hasn't been a need to." (Chen, 2016). As a result Seattle banned the use and sale of plastic bags in the city (despite the city's population growing by 10%), between 2010 and 2014, the city saw the residential annual tonnage of plastic waste drop from 262 tons to 136 tons (Hoffman, 2016).

## **2.2 Information Regarding Cloth Bags**

The term cloth bag includes any bags that are reusable and that are made without HDPE plastic. There is a wide range of cloth bags including backpacks, natural fiber totes, hemp bags and jute bags. Cloth bags are reusable and could help reduce the use of materials needed for single-use bag production. The use of cloth bags also reduces plastic pollution by reducing

plastic use all together. Because of the benefits of using cloth bags, several companies have started business in cloth bag production. One company titled “The Cloth Bag Company” has been producing these bags in the US since 1989. Because of high demands of cloth bags, the company sells their reusable bags starting at \$4.75 for a bag with additional discounts if sold in bulk. Several non-profit organizations have turned to producing and selling reusable cloth bags. One of these organizations started in Australia and has now spread across the world to make a difference. The company is called “Rags2Bags.” This company works to encourage customers to stop using disposable plastic. They slogan their bags with saying how long it takes to break a habit; that habit being using single use plastics. It seems cloth bags are being accepted and adopted by everyone, but some age groups are more likely to use them than others. In people roughly 50-64 years old almost half use reusable grocery totes/bags made from cloth or other materials. In those 30-49 years old, those using reusable bags are slightly below half at 42.17%. In the last age group, ages 18-29 almost 40% say they use reusable grocery bags (Kunst, 2019). With the benefits that stem from cloth bag and reusable bag use as well as the cost it takes to clean and dispose of plastic, many cities are moving towards getting rid of plastic bags all together.

### **2.3 Satisfying the People, the Economy, and the Environment**

A small challenge to the production of cloth bags versus plastic bags would be that plastic bags are cheaper to make and produce. However, with people desiring to change and help the environment, the demand for reusable bags and cloth bags are high. Therefore, companies such as the Cloth Bag Company can sell their bags for a lower price. Having reusable or cloth bags also helps people to avoid unwanted fees that come with still using plastic bags in certain cities and states.

When it comes to saving the environment, creating a single cloth bag is more harmful for the environment than creating a single plastic bag. With harmful ozone depletion, air pollution, plastic might seem like less of a problem. However, in the long run, plastic bags can take years to decompose. Plastic bags lack the ability to biodegrade and fill our oceans, which are consumed by marine life. We can even find plastic in some of the food we consume. While creating cloth bags may come with some disadvantages, a study in Denmark found that plastic bags still have the least environmental impact (Schlanger, 2019).

The uniformity of commerce in the state of Oklahoma, a state without a plastic bag ban, but instead a ban on laws banning plastic bags, claims banning plastic bags is harmful to the economy. They claim business sales and profits receive negative effects by banning plastic. The state claims employment opportunities are lost without the production of plastic bags (State Chamber of Oklahoma, n.d.). Massachusetts, a state where notable cities have banned plastic bags, disagrees and believes banning plastic will and has had positive effects on the environment as well as the economy. Businesses don't make plastic bags for free and plastic bag retailers collect millions from retailers and those retailers pass those costs onto us as consumers. Plastic bags also end up in landfills, which then fills the landfills and they must be taken somewhere to be burned, which also isn't free. This can cost \$80 a ton if not more (Pecci, 2018).

In recent past, one could argue that the public perception of plastic products has shifted. Taken from an article by Rachel Smith on "Why people can stop using single-use plastics", she explained how the public is becoming progressively cognizant of the dangers that single-use plastic present. As people are becoming more mindful of the effects of plastic pollution, people's attitudes are changing. The pollution crisis is only getting worse and this could be the catalyst

that America needs for its customers to make the change away from single-use plastics such as plastic grocery bags.

## **Chapter 3- Methodology**

In order to assess the receptivity of customers changing to cloth shopping bags from what they are currently using we will use the following methods to research our two main objectives.

### **3.1: Understanding Acceptable Prices for Cloth Bags**

It is vital to understand customer willingness to make the change to cloth shopping bags. A major factor in a shopper's willingness to make this change could be due to the price of each cloth bag that they must buy. To become more familiar with the maximum price a customer would pay for each reusable cloth shopping bag, I conducted a survey. In this survey, I asked 50 confidential people of varying ages how willing they would be to pay 5 cents, 25 cents, 50 cents and a dollar to buy a cloth bag to use instead of plastic or paper bags. Our survey first asked each person's age from a range of 10 - 20 years old, 21 - 30 years old, 31 - 40 years old and 41 years old and over. This gave us a good understanding of which demographic is least and most likely to make the change to a reusable cloth bag. Next, we asked each person their willingness to pay the price increments listed above each as their own question sharing the possible answers of 0%, 20%, 40%, 60%, 80%, and 100%. Furthermore, I then asked these same questions again, only this time instead I stated that the proceeds would go to a local charity. This gave us crucial information so we could create the link and determine the maximum amount of money a person is willing to spend per bag to make the change. This also gave additional information to analyze if a person is more or less likely to purchase a reusable cloth bag if the participant knew that their money was going towards a noble cause.

The surveys will be filled out via Qualtrics through WPI's access as a survey tool (Barton, Qualtrics, 2020). This is because it allows for 50 people to complete the survey.

Qualtrics has the additional benefit of having optional demographics and slider question types.

<https://wpi.ca1.qualtrics.com/Q/MyProjectsSection>

### **3.2: Understanding the Current Usage of Plastic Bags in Two Local Stores**

Much like the rest of the cities and surrounding towns in the United States, Worcester and its county contain many grocery stores ranging in size. We plan to find a significant amount of information from talking to managers and owners of these stores. Not only will we learn additional information about customer trends, but we also will gain insight into the business side of the conversation. I put together the following questions as a structured interview for Stop & Shop and Big Y.

- How often do customers use the provided plastic/ paper bags?
- How often do customers have their groceries double-bagged?
- How often do customers bring in their own bags?
- Do you have plans on eliminating plastic and or paper bags?
- What do you think would have the biggest influence on the possibility of shoppers switching to cloth bags instead of using plastic or paper bags?

A structured interview is a common form of data collection. In this method, we will ask the scripted questions listed above and nothing else. We are choosing to apply this method because it eliminates the potential risks involved in conducting interviews.



## **Chapter 4 - Results**

In the methodology section, I listed the methods and reasons for their use. In this section, the results have been analyzed and described. The conducted interviews and their findings are also in this section.

### **4.1 Survey Results**

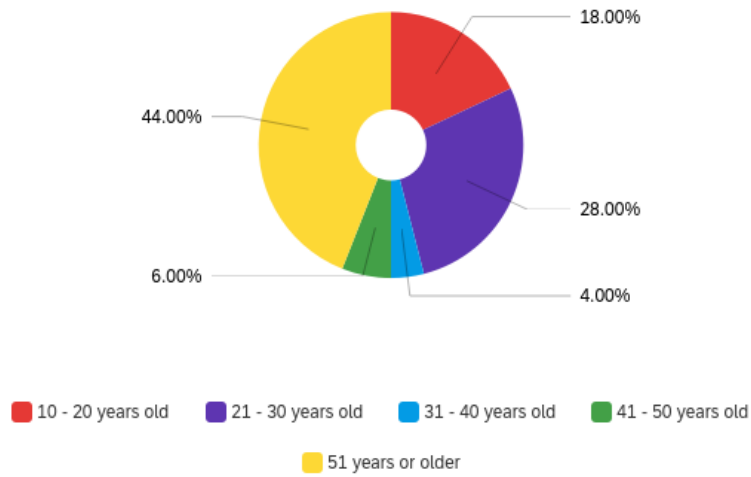
After successfully receiving the proposed and desired 50 responses to the survey, I was ready to begin to analyze the information. Of the 50 respondents of the survey, about half (22 respondents) were over the age of 51. The next most common response age group was that of 20 - 31-year-olds having 14 responses. This was a reasonable spread as the age ranges of 10 - 30-year-olds had a combined total of 23 responses. People from this age range typically have a lower amount of disposable income than people above the age of 51.

Overall, the survey showed that the majority of the respondents were willing to pay any of the chosen amounts of money for a reusable cloth shopping bag. The second and seventh questions asked how likely they would be to pay 5 cents for a reusable cloth shopping bag without proceeds going to a charity and then with going to a charity respectively. To no surprise, these questions had the highest percentage of respondents selecting the “100% option”. In fact, 43 of them (86%) selected this choice for each of these questions. Although, the latter question contained one less “0% willing” option. After each of these two questions in their respective categories, each subsequent question’s price increase saw a low but steady decrease in respondents selecting the “100% willing” choice option. The only exception to this rule is that there was one more “100% willing” selection for the 1-dollar question for charity than the 50 cents question for charity.

Figure No. 1

The following represents the percent of all 50 participant's different age groups

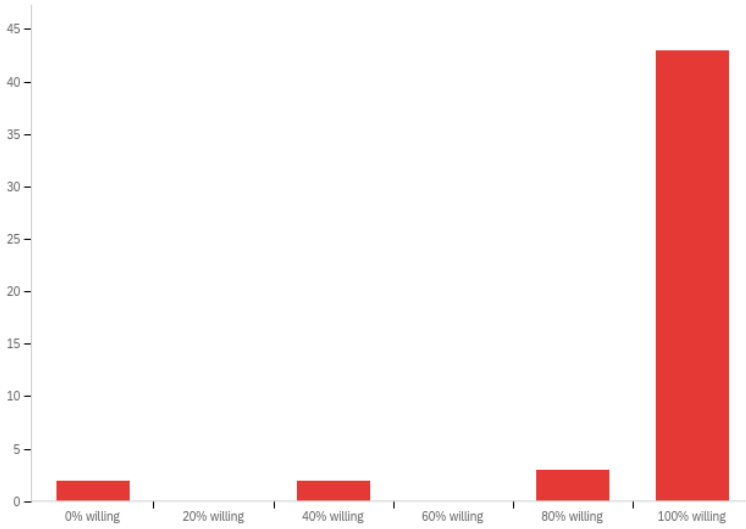
Survey Participant's Age



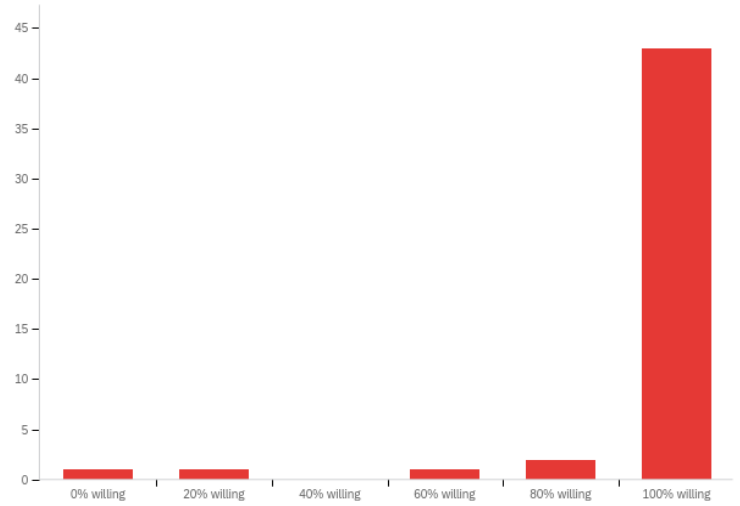
Figures 2 and 6 (respectively)

The following represents how willing the 50 survey participants would be to pay 5 cents for a reusable cloth shopping bag without versus with proceeds going towards a local charity.

Participant Willingness to Pay 5 Cents for a Reusable Cloth Shopping Bag



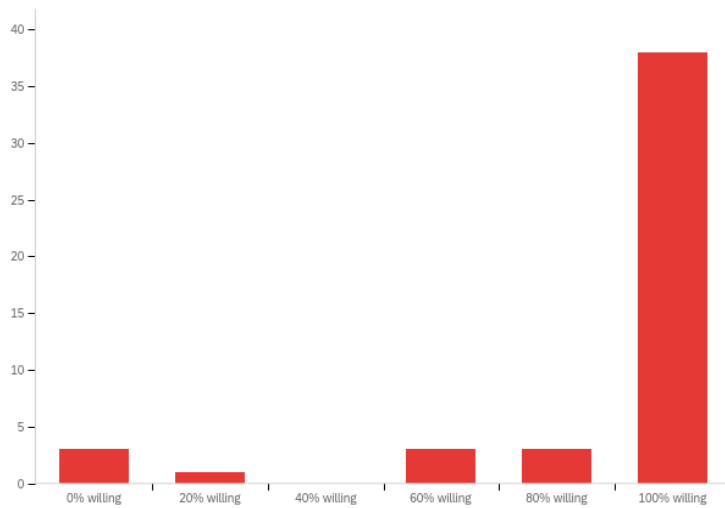
Participant Willingness to Pay 5 Cents for a Reusable Cloth Shopping Bag with Knowledge of Charitable Proceeds



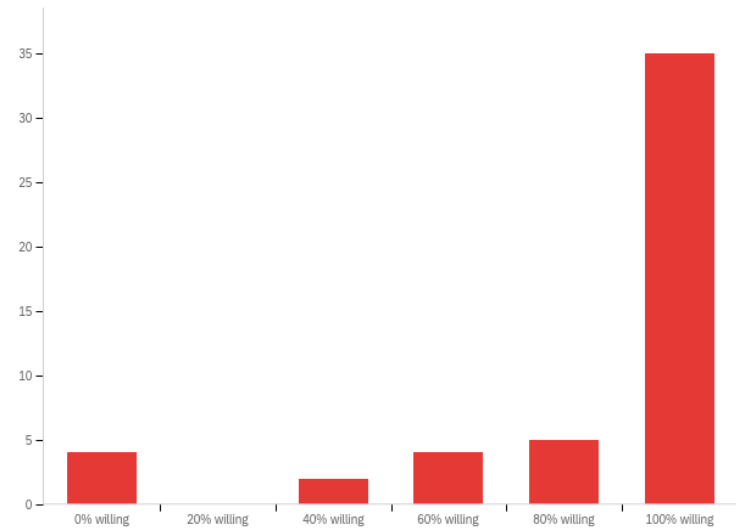
Figures 3 and 7 (respectively)

The following represents how willing the 50 survey participants would be to pay 25 cents for a reusable cloth shopping bag without versus with proceeds going towards a local charity

Participant Willingness to Pay 25 Cents for a Reusable Cloth Shopping Bag with Knowledge of Charitable Proceeds



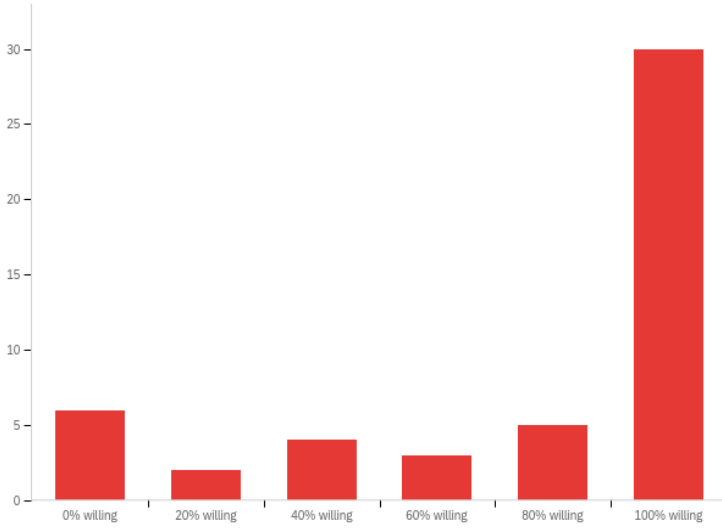
Participant Willingness to Pay 25 Cents for a Reusable Cloth Shopping Bag



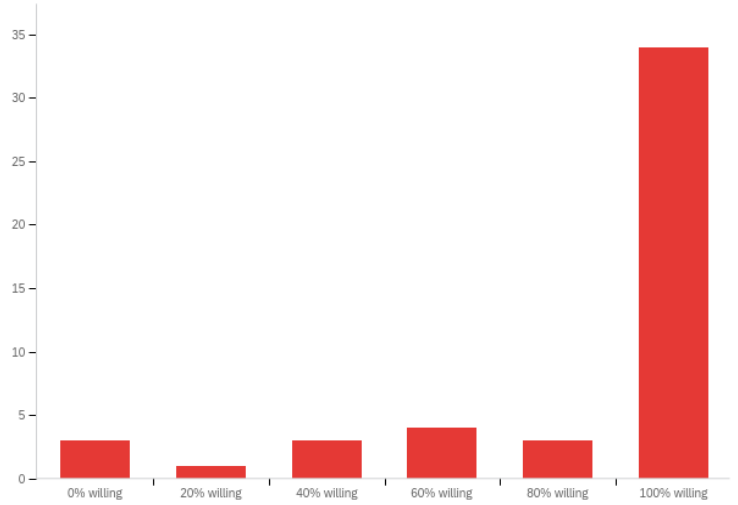
Figures 4 and 8 (respectively)

The following represents how willing the 50 survey participants would be to pay 50 cents for a reusable cloth shopping bag without versus with proceeds going towards a local charity

Participant Willingness to Pay 50 Cents for a Reusable Cloth Shopping Bag



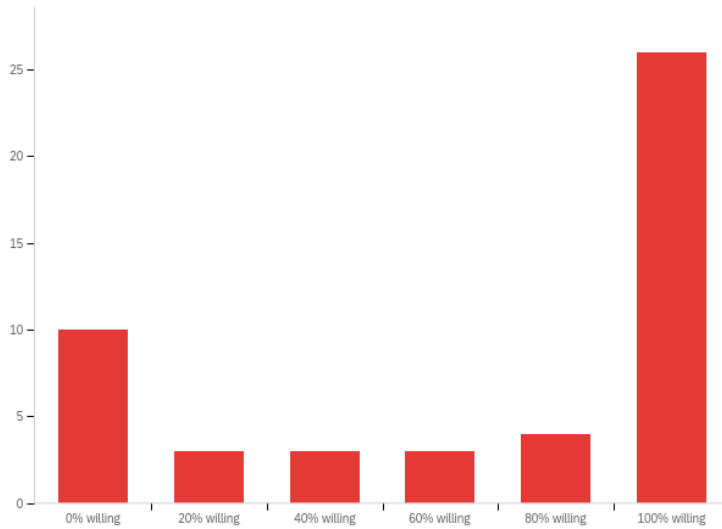
Participant Willingness to Pay 50 Cents for a Reusable Cloth Shopping Bag with Knowledge of Charitable Proceeds



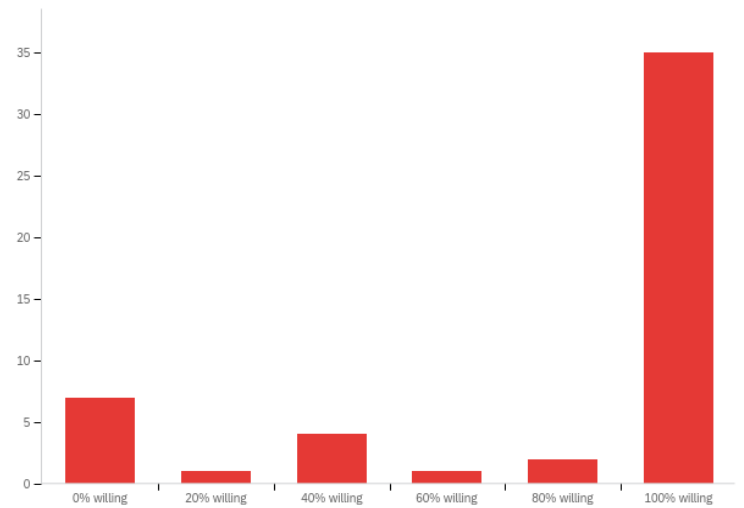
Figures 5 and 9 (respectively)

The following represents how willing the 50 survey participants would be to pay 50 cents for a reusable cloth shopping bag without versus with proceeds going towards a local charity.

Participant Willingness to Pay 1 Dollar for a Reusable Cloth Shopping Bag



Participant Willingness to 1 dollar for a Reusable Cloth Shopping Bag with Knowledge of Charitable Proceeds



## 4.2 Interview Results

The first interview I conducted was for Stop and Shop at their West Boylston location in Worcester. This interview was held on March 3rd before noon and the manager at this store wanted to keep their name anonymous. This interview provides information that could be considered as typical for large grocery store companies. The interview began as I asked the manager the first question. Their answer to this question set a precedent for the questions to follow. Their answer was simple, “All the time.” The manager later added that only about 1 in every 20 customers brings their own bags to the store. The manager also said that the Stop and Shop location in Lincoln Street double bags the customer’s groceries far more often than the West Boylston location. The interview concluded after the manager gave me a first-hand insight into what he thought were the biggest influences on shoppers switching to reusable cloth bags.

This manager told me two things; first, “Cost is a major factor”, and “it would require a culture change.”

The second interview I conducted was for The Big Y in Spencer, Massachusetts on March 3rd with the manager, Pat. This store was selected because not only is it a part of a chain of grocery stores, but this company also moved away from providing plastic bags as a part of a “company-wide initiative.” Information from this interview will serve as valuable information for future additions to this project because it shows how a big company could eliminate plastic grocery bags while retaining its customers as well as providing evidence or proof that customers can and will convert to reusable bags. This interview serves as a contrast to the previous interview. The interview began as I asked Pat the first question, he promptly informed me of the company's policy against single-use plastic shopping bags and explained how his store charges 10 cents per paper bag for their customers. Pat graciously explained that it's very rare that customers pay this 10-cent fee and that about 90% of shoppers there bring and use their own reusable bags. Most of these reusable bags aren't cloth however and instead are constructed from a plastic-like material. Later via research, I learned that they're made from non-woven polypropylene. Pat made it clear that (much like Stop and Shop) as the manager, he has no say on possible future plans to eliminate or further eliminate plastic and paper bags.

## **Chapter 5 - Recommendations and Discussion**

In recognition that it's nearly impossible to create a plan for research in short order that encapsulates all areas sufficiently, this section identifies possible outcomes and alternatives that could have been explored.

After analyzing the results from both the survey and the interviews, I noticed a great deal. When I evaluated the survey, I noticed that the price ranges could have been higher based on the results. There was an overwhelming percentage of respondents selected that they would pay 1 dollar for a reusable cloth bag (52% of the survey participants said that they would be 100% willing to pay a dollar for reusable cloth bags and 70% of the survey participants said that they would be willing to pay a dollar for a reusable cloth bag if they know the proceeds would go toward a local charity). Depending on how much it costs to manufacture and distribute cloth bags, I think the price customers would pay could be higher. This is because cloth bags last longer than other reusable alternatives and can be washed in a person's washing machine. Future IQP projects following this one could have their survey start at 50 cents and up to 3 dollars. Another detail I noticed while studying the survey results was that the person's age didn't seem to play a significant role in their decision to pay more for reusable cloth bags. This could be due to the maximum value of these bags being 1 dollar and or because the survey was designed to be anonymous meaning the older and younger respondents' results cannot be separated to depict a discernible difference in the likelihood of buying reusable cloth bags. As previously mentioned, (to a lesser degree) the socio-economic status for the survey participants as well as a general location of their residence could have been expanded for the survey. In doing so, conclusions could be drawn between the participant's household income and communities and their local

grocery stores. An example of a bit of information I missed from my survey was revealed during an interview I conducted. When I spoke with the manager of Stop and Shop of the West Boylston Street location in Worcester, they told me that its location's customers use far fewer plastic bags than the customers frequent at the Lincoln Street location also in Worcester. The surrounding areas of each location in the city are significantly different and an inclusion of the survey could potentially uncover additional results similar to this. A few ways this could have been possible are including a question for how often they go to the grocery store and making the survey less anonymous so that the results are more specific.



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## **Appendix: IRB Approval**

### **IRB Approval Form**

#### **Institutional Review Board**

FWA #00015024 - HHS #00007374

#### **Notification of IRB Approval**

**Date:** 07-Feb-2020

**PI:** Oates, Karen K

**Protocol Number:** IRB-20-0397

**Protocol Title:** Upcycling Textiles for Homeless Shelters

**Approved Study Personnel:** Oates, Karen K~Barton, Shayne~

**Effective Date:** 07-Feb-2020

**Exemption Category:** 2

#### **Sponsor\*:**

The WPI Institutional Review Board (IRB) has reviewed the materials submitted with regard to the above-mentioned protocol. We have determined that this research is exempt from further IRB review under 45 CFR § 46.104 (d). For a detailed description of the categories of exempt research, please refer to the IRB website.

The study is approved indefinitely unless terminated sooner (in writing) by yourself or the WPI IRB. Amendments or changes to the research that might alter this specific approval must be submitted to the WPI IRB for review and may require a full IRB application in order for the research to continue. You are also required to report any adverse events with regard to your study subjects or their data.

Changes to the research which might affect its exempt status must be submitted to the WPI IRB for review and approval before such changes are put into practice. A full IRB

application may be required in order for the research to continue.  
Please contact the IRB at [irb@wpi.edu](mailto:irb@wpi.edu) if you have any questions.  
\*if blank, the IRB has not reviewed any funding proposal for this protocol

### **Email Confirmation**

Hello again, I just finished working on the documents you wanted to be included into the application. In case you don't read this until next week and forgot, my name is Shayne Barton and we met Friday afternoon to go over my IRB application and you suggested that I should email you to let you know that I submitted it so that you can fast pass my application. Thank you again for all your help, I really appreciate it.

Shayne Barton

Hi Shayne,

Your study has been approved. There was a problem in the system – the letter went to Prof. Oates, but we had a glitch with it going to your email.

You can begin your research.

All the best,  
Ruth