A QUANTITATIVE ANALYSIS OF THE EFFECT OF TEXTILE MILL WATER QUALITY LABELS ON CONSUMER PURCHASE INTENTION FOR APPAREL

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CHAPTER I: INTRODUCTION

Chapter I includes the following sections (a) background of the study, (b) purpose of the study, (c) significance of the study.

**Background**

Companies are always looking for ways to set themselves apart from their competition. One way companies have done this is by appealing to consumers with respect to environmental concerns. Patagonia is a good example of an apparel company that has used this approach. Specifically, Patagonia implemented a more transparent supply chain, uses organic cotton, recycled polyester and nylon, and has transparent down from non-force fed ducks (Patagonia 2015). One opportunity apparel companies in the environmental forefront have yet to capitalize on is the use of water in apparel production. This element of the production process and its impact on the environment has frequently been overlooked as a way for apparel companies to connect with consumers. That is, even when apparel companies have made improvements in their water management during production for any reason, these changes have generally not been marketed to consumers.

Textile and clothing production pollutes the environment in three main ways: air, water and solid waste. It is no surprise that textile production causes air pollution, as all industrial exhaust does. For textile production, this form is the least unique of the three main pollutants and can have universal treatments across industries. The solid waste produced mainly comes from excess fabrics or trims, of which, approximately 75% is recycled and avoids landfills (Chen & Burns 2006). For a factory, solid waste represents inefficiency, so companies try to recycle it as much as possible. Water pollution, on the other hand, is not related to efficiency, and reducing water pollution will almost always
cost more money. These costs discourage factories from reducing pollution, which results in water pollution being the largest environmental pollutant resulting from the textile industry.

The Higg Index is made by the Sustainable Apparel Coalition and clothing brands use it as a common assessment tool to measure their environmental, social and labor impacts. To score a facility’s environmental impacts, the Higg Index assigns values assessing the environmental management system or program, energy use and greenhouse gas emissions, water use, wastewater/effluent, emissions to air, waste management and chemicals management. Water use and wastewater/effluent together are 33.4% of the weight of the overall environmental score (Higg 2015). Water has the biggest influence on a company’s Higg Index score yet it is still the industry’s biggest source of pollution.

Water is a finite resource that is necessary for health and life, yet clean water is becoming a scarce resource in some parts of the world. Since 1900 the world’s population has tripled, but its water consumption has increased six-fold (Vorosmarty et al. 2000; FAO 2009). However, the largest consumer of water is not actually households, it is industry. In Europe, 40% of all water consumption is due to the industrial and energy sectors, and the largest water consuming industry is manufacturing (WssTP 2011). From 2002-2007 the manufacturing industry in Europe used approximately 22,500 million m$^3$ of water a year (EEA 2010). In China, one of the world’s largest textile and clothing producers and exporters (WTO 2008), 8.5% of the total water use and 10% of the total wastewater discharge comes from the manufacturing sector (MIIT 2009). China has a total yearly freshwater withdrawal of approximately 554.1 billion m$^3$ (World Bank 2013). Water is a big part of the textile industry and any meaningful environmental effort would
have a substantial impact. Textile manufacturers need water for dyeing, printing and finishing processes including sizing, desizing, and mercerization. Textile companies like to use high quality, fresh water during production, and it is not uncommon for the wastewater to enter the sewage system without any treatment (Vajnhandl, S. & Valh, J.V., 2014). If the wastewater will be treated at the sewage treatment facility before being reintroduced into the environment, the treatment facility may not have the ability to treat this textile effluent properly. For example, sewage treatment facilities are not equipped to decolor water containing coloring agents. Instead of these coloring agents being treated, they are simply diluted until they are no longer visible. Being at a level of dilution concerning visibility does not mean the water is at a level of safe dilution, so this diluted effluent may still pose an environmental risk.

Wastewater treatments can have a lot of variance. A basic wastewater treatment plant in the U.S. uses a primary treatment to remove solids, a secondary treatment to remove organics and then the water is sent back into the environment. Figure 1 shows a theoretical diagram of this process.

![Wastewater Treatment Diagram](image)

**Figure 1: Theoretical wastewater treatment diagram**

Untreated textile effluent contains high concentrations of salts, total suspended solids, color, nutrients (nitrogen and phosphorous), toxic compounds like surfactants, heavy
metals and chlorinated organic compounds as well as a high chemical oxygen demand (COD) (Ergas et al. 2006). In this treatment the COD will be reduced (depending on the level it may or may not be to an acceptable amount) and the suspended solids will be removed. But the salts, color, nutrients and toxic compounds are not affected and can remain in the water. Water with high salinity affects vegetation, leading to a decline in biodiversity, reducing crop yields and corroding machinery, roads and bridges (AU Department of the Environment, 2012). Colored water impairs the ecosystem because it limits light penetration thereby limiting plant growth (CA Sate Water Resources 2015). Having too many nutrients, like nitrogen and phosphate, can result in excessive growth of algae and other unwanted aquatic plants. A high concentration of nutrients can also result in harmed fish and shellfish that may be ecologically and economically important (Fuhrer et al. 1999). And of course, toxic compounds in water can affect plant, animal and human health (WA Department of Ecology 2015). Since each of these factors may be unaffected by general treatment at a wastewater facility, it is often required by law that the water be pretreated at the textile mill. Effluent and resource management are both important factors within environmental sustainability for textile mills.

**Purpose of the Study**

Environmental concern in the U.S. has steadily increased since the first Earth Day in 1975 (EPA 1990). As part of this movement, consumer interest in “eco-friendly” products has also increased (Purohit 2012). In the apparel industry, consumers express concern with issues such as the use of chemicals (e.g. pesticides on cotton), the use of GMO seeds, and excessive water use. Previous research on the consumption of eco-friendly apparel has focused on organic cotton (Brookshire & Norum 2011: Hustvedt &
Dickson 2009; Norum & Brookshire 2011) or eco-friendly clothing in general (Connell 2011; Gam 2011; Kang et al. 2013; Phau & Ong 2007). Much of the prior research about textile mill water quality has examined different types of treatments and water quality changes from an engineering point of view while prior consumer research has focused on elements of environmental concern, but not on the water quality used to produce apparel products. The purpose of this study is to examine, from a consumer point of view, the relationship between apparel acquisition and particular environmental conditions under which the apparel was produced. The specific objective is to examine whether consumer information regarding water reuse or factory effluent affects consumer purchase intention for apparel.

**Significance of the Study**

This study is important because it bridges the gap between one of the world’s most important resources and one of the world’s largest industries. A factory’s water management in the production of apparel could affect a consumer’s purchase intention for that apparel. Knowing more about this relationship could provide insight to apparel companies about the possibilities for communicating with consumers about these environmental efforts and, in turn, help in promoting their products. Giving consumers information about water treatment techniques would also help consumers gain a basic knowledge of the processes, and better understand what techniques are good for the environment. Educating consumers is an important step in helping them choose more environmentally friendly products.
CHAPTER II: LITERATURE REVIEW

Chapter II includes the following sections, (a) environmentally friendly apparel, (b) eco-labels, (c) socially responsible labels, (d) consumer education, (e) consumers and water quality, (f) factory effluent, (g) water recycling.

Environmentally Friendly Apparel

The production and transportation of apparel is going to have an unavoidable negative impact on the environment. It is virtually impossible to have a 100% “green” product. Factories need electricity to run, trucks use gasoline to move the products, etc. For the purpose of this paper, environmentally friendly apparel refers to apparel that is produced with specific measures taken to reduce its environmental impact. Whether or not consumers prefer eco-friendly clothing is not much of a debate. With all other factors held constant, if given the choice between environmentally friendly clothing and traditional clothing, most consumers would choose the former. Hustvedt and Dickson in their article, “Consumer likelihood of purchasing organic cotton apparel: Influence of attitudes and self-identity” found that when purchasing clothing, 38% of participants considered organic fiber content when making their decision (2009). In reality though, all other factors cannot be held constant, especially because eco-friendly clothing is almost always more expensive than traditional clothing. Consumers do not base their decision solely on environmental impact; they also consider price, quality, convenience, and/or brand name (Boulstridge & Carrigan, 2000). However, Husvedt and Bernard also found that consumers are willing to pay a premium for clothing made from organic fibers that come from non-genetically modified (GM) seeds, when given the option of organic/nonorganic and GM/non-GM (2008). Norum and Ha-Brookshire gave
participants the option between a shirt that was $20, $50 and $80, made from conventional farming techniques or sustainable farming, and U.S. grown with transparency and unknown origin with no transparency. The most preferred combination (32.2%) was a $20 shirt with fibers made in the U.S. with transparency and using sustainable farming practices. Overall a low price was the most important, accounting for 78.3% of market share (2011). While consumers may prefer to pay less for both eco-friendly and traditional clothing, they are actually willing to pay more for eco-friendly clothing. One study found that for a shirt retailed at $30, on average, consumers are willing to pay $5 or more for it if it is organic, sustainable and U.S.-grown. Overall, over half of respondents were willing to pay more for this shirt in a sample of U.S. consumers (Ha-Brookshire & Nourm 2011).

Numerous studies show that consumers prefer to buy clothes made in the U.S. or that have origins in the U.S. The Norum & Ha-Brookshire (2011) findings discussed earlier showed that price was the most important factor (58.5%) to consumers, but the second most important factor was that it was made from a U.S. grown fiber with transparency (30%). The consumers that preferred sustainable farming practices did not prefer the product as much if they did not know were the fiber came from (less than 10%) (2011). The Hustvedt & Bernard (2008) study found that the participants were willing to pay more (80c more per sock) if the fiber originated in Texas (where the study took place). One reason for why consumers prefer American made products is to help protect Americans jobs, but that may not be the only reason why consumers prefer local or made in the U.S. apparel. Connell (2011) interviewed 27 participants that self-identified as eco-conscious when shopping for apparel. Many of the participants said that one way they
shopped eco-consciously was to buy clothing made in the USA. One reason is to reduce the carbon footprint from the item traveling to its destination. Another was that the U.S. has stricter environmental standards than other countries, so the respondents felt more confident that the production was more environmentally friendly. These reasons could explain why consumers prefer apparel made in the U.S.; they see these products as more environmentally friendly.

**Eco-Labels**

Most consumers learn about how environmentally friendly a product is by information the company gives to the consumer, generally though eco-labels. According to the Global Ecolabelling Network an eco-label identifies the proven environmental preference of a product within a specific product category (2004). The use of eco-labels has been increasing over the years and is often used as a marketing tool (Taufique *et al.* 2014). While there are labeling requirements for some situations, e.g., organic cotton, there have been a growing number of labels created by individual companies, non-government organizations (NGOs), and national and international governmental organizations (Green Paper 2014; EPA 2014). Timberland, for example, has a Green Index, which rates the environmental impact of a product on a scale of 1-10. The rating of a product takes the average of the climate impact, chemicals used and resource consumptions ratings (Timberland 2007). B Corporation is a NGO eco-label for companies that meet social and environmental performance, accountability, and transparency standards that are regulated by the B Lab (B Corps 2015). The U.S. has its own eco-labels that are regulated by the U.S. government, for example the USDA Organic label for organic cotton (USDA 2015). The European Commission has the EU
Ecolabel, which identifies products that have a reduced environmental impact throughout their lifecycle based on the European Commission’s standards (EC 2015). When these labels are used in marketing they have been accused of being “greenwashing” because they can use vague, confusing language or lack actual evidence about the environmental impact (Chang 2011; Cone 2011; Mintel 2011). A great example of using unclear language regarding the environmental impact of a product is Levi’s Water<Less line of denim. When said out loud it sounds as though they make the jeans without water and the line is advertised as using up to 96% less water. While the line does use less water, it is only an average of 28% less over the entire line and it is only during one process of the production. The percentages advertised refer to only one type of jean in the line and only the water used to give the jeans a worn-in look, not any of the other water intensive processes of production (Levi’s 2015). Previous research has shown that third-party labels affect comprehension (Beltramini & Stafford 1993) and perception of product quality (one of the things consumers look at when purchasing sustainable clothing) (Dean & Biswas 2001).

Environmental information can affect consumers’ purchases. One study found that 70% of the respondents were influenced by environmental messages in both advertising and product labeling (Taufique et al. 2014). However, consumers only pay attention to and are affected by the environmental labels that they trust (Thogerson 2013). Getting a consumer to trust a label is difficult. In the Nordic countries, there is an official sustainability eco-label called the Swan label. When residents were surveyed, out of those that could recognize it, only two out of three comprehended the meaning of the Swan label correctly (Effect of Nordic Swan Label 2013). If the residents of a country with an
official eco-label can’t understand the label, how are they expected to know and trust third-party labels? The purpose of eco-labels is to inform customers of the ecological quality of a product, but they are not proving to achieve that. It has been suggested that providing basic information about a product’s reduced environmental impact to consumers may work just as well. For example, Hustvedt and Bernard found that just knowing that a product was made with non-GM fibers, participants were willing to pay more for it (2008). Others have suggested that providing single benefits, such as the rejection of pesticides or artificial additives, could attract customers to a product (Ness et al. 2010; Janssen et al. 2009). Even if it is not certified organic, knowing the other ways a product’s environmental impact is reduced can help increase consumer interest in the product.

**Socially Responsible Labels**

Companies have also started informing consumers about their socially responsible (SR) business practices. Social responsibility is broader than eco-labels and includes information about a company’s commitment to the environment, fair labor, education and other social causes (Jana 2007). This information can often be found on the company’s website, but in the store it can often be found on hangtags and displays. Legally hangtags must have fiber content, care instructions, country of origin and manufacture’s identity (FTC 2014). Other information that may be included is brand name, specialized production techniques, environmental benefits, labor standards and high-performance technologies (Thomas 2008). SR tags are designed with written text, symbolic imagery, and third-party certifications or logos to verify SR claims (Hyllegard et al. 2012). Hyllegard et al. (2012) examined consumer’s response to companies’ SR business
practices through hangtags. The hangtag varied by message content (eco-fashion vs. fair labor), message explicitness (low vs. high), and a third-party logo (absence vs. presence), which resulted in 8 different tags. For evaluation, each participant viewed one hangtag that was randomly assigned. The findings support the use of hangtags to inform consumers about apparel companies’ engagement in SR business practices. Results showed that hangtags featuring highly explicit messages and third-party SR logos were more favorable than hangtags featuring less explicit messages and no logos. By accompanying third party SR logos (this includes eco-labels) with highly explicit messages, consumers gain better knowledge about SR practices than logos alone can provide.

**Consumer Education**

Educating consumers is critical to increasing their sustainable consumption practices. Research has shown that when consumers understand how apparel products affect the environment they are more likely to acquire apparel that has reduced environmental impacts (Hustvedt & Dickson 2009; Stephens 1985). Consumers who have greater knowledge about the environment show greater concern for the environment. This environmental concern leads to consumers considering a product’s environmental attributes when they are shopping (Kim & Damhorst 1998). Educating consumers about the environmental impact of a product can help produce more eco-friendly consumers and help companies in selling their product. This education could include information about a product’s effects on water quality.

**Consumers and Water Quality**
Most research done on consumers and water is about their preference for drinking bottled water over tap water. The consumption of bottled water has been increasing by 10% yearly since 1996, especially in developing countries in Asia and South America (Gleick 2004). Bottled water is chosen over tap water because of its convenience, its taste and its perceived purity (Gleick 2010; Lalumandier & Ayers 2000; Anadu & Harding 2000). Research shows though that bottled water isn’t necessarily any safer to drink or taste any better than tap water in the U.S. (Lalumandier & Ayers 2000; Raj 2005). The FDA regulates bottled water while the EPA regulates tap water causing a gap in regulations (Blaurock-Busch 2009). In almost all parts of the U.S., bottled water is tested less often by independent or government scientists than tap water (Parag & Roberts 2009). Comparing test results for contaminants, nether tap or bottled water proved to be safer than the other (Blaurock-Busch 2009). Many local, non-scientific blind taste tests have been done across the U.S.. At Boston University, of the 67 taste testers only a third identified the tap water correctly, another third thought the tap water was bottled water and the remaining third couldn’t tell the difference (Friday 2011). Good Morning America asked its audience in a blind taste test which tasted better New York City tap, Poland Spring, O-2 or Evian and 45% said New York City tap water tasted the best (ABC News 2015). News Channel 5 in Cleveland did a taste test with Sam’s Choice Purified Water, Aquafina and Cleveland tap water and twice as many people chose Cleveland tap water over Sam’s Choice (Walsh 2014). Despite this 85 million bottles of water are consumed in the U.S. every day, which is more than 30 billion a year (Gleick 2010) and that is with bottled water costing 500 to 1,000 times more than tap water (Ferrier 2001).
One survey, distributed to 21 of the U.S. states, found that 15% of respondents did not feel that their home drinking water was safe to drink. It was found that ground water quality was a significant predictor of bottled water usage while environmental attitudes were not (Hu et al. 2011). Plastic disposable water bottles’ negative impact on the environment recently caused a backlash against the bottled water industry, yet this didn’t seem to affect participants’ choice to drink bottled water, while their local groundwater quality did. The fact that people all over the U.S. are willing to pay up to 1,000 times more for water just because they think it has a higher quality shows just how much they actually care about water quality, at least when being directly consumed.

**Factory Effluent**

The quality of water effluent coming from a factory is important because that quality directly affects the environment it is released in. Untreated wastewater from textile mills has high concentrations of inorganic and organic chemicals and is highly colored from dyestuff. The untreated wastewater also contains contaminants such as salts, enzymes, surfactants, and oxidizing or reducing agents (Badani et al. 2005). The pollutants that come from these wastewaters are high suspended solids, COD, BOD, heat, strong color, extreme pH, and other inorganic pollutants and nutrients (Al-kdasi et al. 2004). What concentrations do these actually get to though?

A case study at a factory in Morocco looked at the specific concentrations of pollutants found in the wastewater at a cotton knit factory (Mountassir et al. 2011). In Morocco, the textile sector is one of the most important industries and it is also the sector that produces the most excess wastewater (Choukr-Allah 2005). The researchers took water samples during the heaviest periods of activity and the samples were taken directly
from the machines and from the global effluent containing wastewater from the dyeing, bleaching, and washing processes. The average temperature of the water was 35.23°C (95.41°F) but at its hottest was 60C (140 F). High temperature can be harmful because it increases the acceleration of chemical and biological reactions, which leads to a deficiency of oxygen, nuisance odors, and inhibiting activity of most microorganisms (Mountassir et al. 2013).

The average pH was 9.3, which exceeds the EU range of 6-9 for any industrial wastewater. The bleaching process is known for raising the pH of textile effluent, which can be undesirable. The pH of the effluent affects the physio-chemical properties of water, which affects aquatic life, plants, and humans. If a high pH is released into rivers it can increase the salt content of soils, and high salt content in soil can make arable land partially or totally infertile. Salts and sodium carbonate are used in the dyeing process and sodium sulfate (electrolytes) is used in the bleaching process. These will cause the electrical conductivity (EC) of the water to increase. The study found the mean values for EC to be 3.4 mS/cm, which is higher than the Moroccan standards allow (2.7 mS/cm).

The total suspended solids were also higher than permissible. They fell within the range of 127-600 mg/L, which left the majority of samples much higher than the permissible amount (400mg/L). A high total suspended solids creates high amount of sediment and reduces light penetration, which decreases photosynthesis for the plants in the water. Finally, both the chemical and biological oxygen demands (COD and BOD, respectively) were greater than their established limits. The EU limit for COD is 500 mg/L, and the samples taken from the factory were over twice that at 1-2 g/L. BOD has a limit of 400 mg/L and the samples ranged from 300-500 mg/L. Further, these
concentrations meant that the BOD to COD ratio in the wastewater was between .11 and .34, which means the wastewater was hardly biodegradable.

The nutrients measured were TN (which is the sum of Kjeldahl nitrogen, [TKN], nitrate-nitrogen, [N-NO3], and nitrite-nitrogen, [N-NO2]), and TP (total phosphates). These values in the study showed the content of nitrogen compounds and phosphates in the effluent to be high. All the nutrients measured were higher than the EU standards. Wastewater rich in nutrients can be helpful in the treatment process if there is biological treatment with an activated sludge system (aerobic treatment) used. In the textile wastewater effluent there is low biodegradability of the dyes and chemicals used so biological treatment with activated sludge does not always work well. Therefore the nutrients are of no use.

Metals were also measured in the effluent including Al, Fe, Mn, Cu, Zn, Pb and Cd. Metals are used in textile production as oxidizing agents, metal complex dyes, dye stripping agents and finishers (Zeiner et al. 2007). Even in low concentrations metals can be toxic to living organisms. All of the metals that were tested for were found in at least trace amounts and Fe, Cu and Pb were above the EU limit.

Overall, nearly everything measured in the samples were higher than the EU and Moroccan limits for discharge into municipal sewers. These measurements were taken without any pretreatment. Considering the limitations of municipal treatment systems, this study shows the importance of pretreating the effluent before it is released into the sewer system, and yet this wastewater may be released without any pretreatment (Vajnhandl & Valh 2014). Countries vary on their pretreatment standards and some have none at all. Beyond the country standards, factories and companies have their own
requirements. From a consumer standpoint there is no way to know the water quality of the effluent generated by the factory where their clothing is made. It could be toxic or it could be the same quality as the water being taken in.

**Water Recycling**

Most water recycling research has been done on drinking water. In areas that don’t have adequate drinking water supplies all year round like California and Australia, recycling sewage water is one option for more drinking water. Rather than putting treated sewage effluent into the environment and treating water taken from the environment for drinking water, sewage effluent would just be directly treated and used as drinking water. The problem with this though is public perception. Unsurprisingly people are wary about drinking recycled wastewater (Hartley 2006). In California the belief that even the best technologies can remove all impurities and pathogens from wastewater is in decline (Bruvold 1998). Research shows that acceptance of recycled wastewater declines as its use becomes more prevalent (Hurlimann 2007; Marks 2006; Marks *et al.* 2006; Nancarrow *et al.* 2008; Toze 2006). Po *et al.* (2005) found that treated wastewater had an acceptance rate of 32% if it is to be used for drinking water and 78% if it is to be used for washing clothes. Lease *et al.* (2014) found that recycling water in a food factory is likely to lead to positive responses if the source of information is credible and trustworthy.

In industry, water reuse varies by industrial sector and is strongly dependent on specific situations (Vajnhandl & Valh 2014). According to the FOTOTEX project (2005), a universal wastewater treatment system in the textile industry would be almost impossible because of the complex composition of the wastewater. The main challenge in recycling water is finding a “catch-all” treatment for the widely ranging water qualities
produced by a textile factory. Low water quality can be used for some processes, e.g. washing down equipment, and high water quality is needed for other processes, e.g. dye baths and finishing baths. About 50-70% of water consumption is used for processes that need moderate water quality, e.g. the washing-off stages after scouring, bleaching, dyeing/printing and finishing (Vajnhandl & Valh 2014).

Recycling water means less water needs to be taken in and out. Pretreatment needs to be done before the water can be reused, but the amount of pretreatment depends on what the water is going to be used for. Consumers have been taught all the benefits of recycling, and therefore this recycled water should be attractive to them because it is far removed from their direct use.

The review of literature shows that, from a consumer point of view, research on textile mill water quality is limited. Water recycling and water effluent treatments at textile mills have been researched, but the attitude of the end consumer of the textile product has not been researched. Environmentally friendly clothing has been researched from the consumer’s point of view, but this research does not include information about water treatments. These issues are addressed in this research.
CHAPTER III: CONCEPTUAL MODEL

Chapter III contains the following sections, (a) theory of planned behavior, (b) research gap, (c) hypothesis.

Theory of Planned Behavior

It can be very difficult to correctly identify what consumers will purchase. To explain a person’s behavior is very complex. The Theory of Planned Behavior (TPB) attempts to understand behaviors and intentions based on the assumption that humans behave in a reasonable (i.e. predictable) manner (Ajzen 1988). TPB is an extension of the Theory of Reasoned Action (TRA) and was developed to make up for TRA’s limitations in people who have incomplete volitional control (Ajzen & Fishbein, 1980). Volitional behavior is any action that is beyond an individual’s logical and reasoned control (Ajzen 1988). Both theories are centered on the individual’s intention to perform a given behavior. Another assumption fundamental to TRA is that an individual’s behavioral intention to perform an action depends on the individual’s attitude toward the action and its consequences and subjective norms for the action. In other words, if an individual has a positive attitude toward an action and the people around them do too, then the individual is more likely to perform it. In general, the stronger an individual’s intention to engage in a behavior, the more likely the individual is to perform the behavior. TPB is able to identify the effect of non-volitional behaviors on behavioral intention and then the resulting behavior, while TRA cannot.

According to the TPB, an individual’s intentions are determined by his/her attitude toward the behavior, subjective norm, and perceived behavioral control. The attitude towards the behavior is the individual’s positive or negative evaluation of
performing the behavior. The subjective norm is the individual’s perception of social pressure to perform or not perform the behavior. Perceived behavioral control is the individual’s sense of ability to perform the behavior. An individual generally intends to perform a behavior when he/she evaluates it positively, experiences social pressure to perform it and believes he/she has the means and opportunity to do it (Ajzen 1988). Their relationship is shown below in figure 2.

Figure 2: Theory of Planned Behavior Flow Chart

**Attitude**

According to TPB an individual’s attitude toward a behavior affects their intention to perform the behavior depending on if the attitude is positive or negative. The attitude toward a purchase intention can be explained by an individual’s positive or negative evaluation of performing the purchase and the resulting consequences of the action. It is more helpful to know a consumer’s attitude toward buying a product than
his/her attitude about the product itself (Ajzen & Fishbein 1980). How a consumer expects the outcome of purchasing an environmentally friendly product (in this case, clothing that comes from factories with environmentally friendly water treatments) will affect their purchase intention, which then predicts actual behavior. A correlation has been found between positive attitudes towards environmentally friendly products and positive purchase decisions, while negative attitudes result in a non-purchase decision (McCarty & Shrum 1994). Laroche et al. found that knowledge about the environment is correlated with attitudes about the environment (1996). If a consumer believes that they can actually affect the environment through their individual consumption behavior then they tend to form positive attitudes toward purchasing environmentally friendly clothing (Kang et al. 2013). TPB suggests that if a person has a positive attitude toward purchase intention then it is expected that he/she will actually perform the action (Azjen 1991).

**Subjective Norm**

The next determination of intention is what an individual’s perception of the social pressure to perform or not perform the behavior is. Because this evaluation is based on the individual’s perception it is called the subjective norm. Subjective norms are a function of beliefs; that is, the individual’s belief that others (either individuals or groups) think he/she should or should not perform the behavior. These are called normative beliefs. If an individual is motivated to comply with others who think he/she should not perform a behavior then the behavior will have a subjective norm that puts pressure on him/her to not perform it (Ajzen 1985). An individual’s reference group may be friends, family, relatives and others. Kang et al. (2013) found in “Environmentally sustainable textile and apparel consumption: the role of consumer knowledge, perceived
consumer effectiveness and perceived personal relevance” that the greater knowledge and experience young consumers have about eco-friendly clothing the less likely they are to be affected by social pressure on its consumption. The study also found that if an individual feels eco-friendly consumption is relevant to his/her own life and social presentation of self-image then he/she will feel a stronger social pressure to purchase eco-friendly clothing. If a consumer believes that the subjective norm will have a positive reaction to purchasing eco-friendly clothing, then they are more motivated to perform the action.

Perceived Behavioral Control

The third determinant of behavior is if an individual feels that he/she has the ability to perform the behavior and the perception of ease or difficulty of performing the behavior. This evaluation is called an individual’s perceived behavioral control. An individual’s resources and available opportunities are going to affect if he/she performs a behavior. The addition of perceived behavioral control is the biggest difference between TRA and TPB. TRB assumes that perceived control is likely to be realistic. Therefore, it can be used as an estimate of actual control and, in combination with intention-to-try, it can be used to gauge if a behavioral attempt will be successful (Ajzen 1985). If a consumer feels that he/she has more control over the difficulties related to purchasing eco-friendly products and he/she feels that he/she has the ability to perform the behavior, then he/she has more motivation to actually perform the behavior. A consumer’s perceived effectiveness or control of making a positive environmental impact gives him/her a higher motivation to consume an eco-friendly product (Roberts 1996). While this does affect purchase intention, it is important to remember that perceived behavioral
control is referring specifically to the behavior of consuming the product, not the effect it will have on the environment.

*Purchase Intention*

According to TPB attitude towards the behavior, subject norm towards the behavior and perceived control toward the behavior together can predict a person’s behavioral intention. Then, according to the theory, the behavioral intention to perform a behavior determines if the action will be performed. So if the three measures show a likelihood of an intention to perform a behavior then there is also likelihood to actually performing the behavior. There are many unanticipated events that can change a person’s intentions and therefore their behavior. These are random events that affect only the individual and balance out leaving the intentions on a whole unchanged (Ajzen 1985). For this study, the intended behavior will be used to predict purchase intention for an item based on the hangtag shown to the participant.

*Research Gap*

Apparel companies are starting to talk more about water use and how to improve it. Nike for example has a mobile app called *Making* that compares 45 different materials used in footwear and apparel production. It was made for designers, but anyone can use it to compare difference aspects of each fiber’s environmental impact, including its water usage (Nike 2015). Denim is known for being one of the most water intensive apparel products to produce (Hoekstra & Chapagain 2010) so companies are coming up with ways to make it using less water. Patagonia has a dying process for its denim that uses 84% less water (Patagonia 2015), and Levi’s has a Water<Less line that uses 28-96% less water in its finishing process (Levi’s 2015). There is not any research to show that having
an eco-friendly treatment of water during production will affect a consumer’s purchase intention. Other eco-friendly aspects have been looked at by researchers but none specifically look at water (Hustvedt & Dickson 2009; Brookshire & Norum 2011; Norum & Brookshire 2011; Connell 2011; Gam 2011; Kang et al. 2013; Phau & Ong 2007). This research will look specifically at environmentally friendly treatment of water during clothing production and how it may affect purchase intention.

Research has been done on the effect the information on hangtags can have on purchase intention, but not using the theory of planned behavior. Hyllegard, Yan, Ogle & Lee (2012) asked participates about purchase intention of an apparel product after viewing different hangtags, but they used the theory of reasoned action, which doesn’t account for perceived control. This research builds on this model and measures attitude, behavioral norm, perceived control and purchase intention.

**Hypothesis**

The hypothesis that will be tested in this study are:

H1: Tags with water effluent information compared to tags with no information will positively influence consumers’ purchase intention.

H2: Tags with water recycling information compared to tags with no information will positively influence consumers’ purchase intention.

People have shown preference for more eco-friendly products, as long as price is held constant. It is expected that providing participants with information about eco-friendly water practices at factories, water recycling or water effluent, that they will be more likely to purchase it than the tag with no information.

H3: Attitude will be positively related to purchase intention.
People who say that they have a positive attitude toward purchasing the item with an eco-friendly hangtag are expected to have a higher purchase intention for the product. The people who see the water recycling hangtag and those that see the water effluent hangtag may have slightly different levels of attitude and/or purchase intention.

H4: Subjective norms will be positively related to purchase intention.

It is expected that if respondents have people who are important to them approve of purchasing the item then they will be more likely to purchase it.

H5: Perceived control will be positively related to purchase intention.

Participants that feel like they have control over purchasing the item will have a higher purchase intention. Figure 3 shows the relationships the variables have in relation to the theory of planned behavior flowchart and their corresponding hypothesis.

Figure 3: Hypothesis Flow Chart
CHAPTER IV: RESEARCH METHODOLOGY

Chapter IV includes the following sections, (a) research design, (b) stimulus material, (c) variables, (d) manipulation check, (e) data collection, and (f) data analysis techniques.

Research Design

In order to analyze consumer response to varying levels of information about water quality on their purchase intention for apparel, an experimental design will be used. This study uses a posttest-only control group experimental design. Respondents will be presented with 3 different hangtags for a between-participant experiment. Each participant will be exposed to a random hangtag about water recycling, water effluent or no extra information (control). A hangtag for a general clothing item will be created for each condition. Each tag gives the participant information about a product’s manufacturing process, that is, if it used recycled water and/or has clean water effluent. Before the final data is gathered, a manipulation check will be done to make sure that participants see a significant difference between the control hangtag and the effluent/recycling hangtags. This hangtag is expected to replicate what could be used by an apparel company to convey information to consumers about their environmental practices, specifically related to water usage.

Stimulus Materials

A hangtag with each stimulus was created. Companies conventionally include the brand name on the hangtag and other information in order to build brand identity, educate consumers about product attributes, inform consumers about the company’s mission and ethos and reinforce brand product labeling and marketing (Baker 2002; Chowdhary
With growing interest from consumers about the environment, companies have started including information on hangtags to show their identity as a socially responsible business, their commitment to the environment, fair labor, education, and other social causes (Jana 2007). Hangtags may include text, symbols/images, and/or third-party certifications or logos in order to relay a company’s environmental or social efforts (Hyllegard et al. 2012). Hangtags with highly explicit social responsible (SR) messages and third-party SR logos were viewed more favorable than hangtags with less explicit SR messages and no logos (Hyllegard et al. 2012). Thus, the information that a consumer could find when shopping will be put on hangtags. Hangtags will be used because they can be kept simple and do not have to be for a specific item. It is kept general so the garment will not affect the participant’s purchase intention. The tag does say it is for a white knitwear item, to make the tag look realistic this information was needed. Making the item general allows the participants to focus on the tag, not whether they like the item.

This study will focus on factory effluent quality because it directly affects the environment. Presumably, it is easy for a consumer to visualize colored water coming from a factory. Even if they know nothing else about the water, it is common sense that colored water is not good for the environment or human health. Most consumers do not have an extensive knowledge about water, so the information on the tag needs to be simple, but not general. Consumers are skeptical about trusting green claims such as “environmentally friendly” and “natural” because they have been over used, are too general and “greenwash” the product (Karna et al. 2001). The majority of Americans trust the U.S. standards for tap water, 91% reported cooking with it and 75% reported
drinking it (Starch 1999). From this, it can be reasonably assumed that the majority of Americans trust the U.S. government’s standards for the quality of water a factory can release. Most consumers do not have knowledge on what makes water clean, but would be unsure of a general statement saying a factory released clean water into the environment. In order to help them understand, the measure of clean water effluent will say it meets U.S. standards. The tag with water effluent information will have the basic tag information and also say, “This product was made at a factory that complies with U.S. water quality standards to keep streams and rivers clean.”

This study also focuses on water recycling because it is easy for consumers to understand, and it is common knowledge that recycling is good for the environment. Consumers may not understand how recycling water works or exactly why it is beneficial, but they know recycling is good so it makes sense that recycling water would help the environment. In order to make the water recycling tag have high explicitness, the tag will tell the percent of water that the factory recycles. Recycling water helps the environment because it takes less water in from the surrounding environment and puts less water out, therefore the factory has a much smaller impact on the waters around it which helps the waters stay clean and healthy. Instead of saying, “recycling the factory’s water” means “the factory uses less water” (which is the reason why it is eco-friendly), the tag will say that it “recycles its water to keep surrounding streams and rivers clean and healthy” (which is how it is eco-friendly). The main reason for this is that it keeps the tags consistent and concise, and the only information changing is whether it says the water is recycled or the effluent is clean. The water recycling tag will say “This product
was made at a factory that recycles 99% of the water it uses in order to keep surrounding streams and rivers clean and healthy”.

Both tags keep the additional information to only a sentence. Both sentences say what the factory does and how it is good for the environment. It is more realistic to expect a consumer to read a one-sentence addition on a tag than one that is longer, even if it offers more explanation.

Variables

There are four independent variables in this study: attitude, subjective norm, perceived behavior control, water quality, and one dependent variable: purchase intention. Participant’s attitudes, subjective norm and perceived behavioral control towards purchasing an item are based on the information on the item’s hangtag. Participants will be asked about their purchase intention for a product that had has one of the three tags on it. These will all be measured on existing scales (see appendix A for measures used in this study).

Attitude

For this study, attitude refers to the participant’s attitude toward purchasing the item the hangtag is on, based on the information on the hangtag. This will be measured as pleasant/unpleasant, harmful/beneficial, good/bad, worthless/valuable and enjoyable/unenjoyable on a 7-point Likert scale. These measures are adapted from Ajzen (2002a) and Kim and Karpova (2010). They contain two separate components, one that is more instrumental and one that is more experiential. The instrumental scale uses adjective pairs like valuable-worthless and harmful-beneficial. The experiential quality scale includes pleasant-unpleasant and enjoyable-unenjoyable. The last set that is
recommended is good-bad because it tends to capture overall evaluation well (Ajzen 2002a).

**Subjective Norm**

This study measures behavioral norm towards purchasing the item the hangtag is on, based on the information on the hangtag. The 4 questions are adapted from Ajzen (2002a), Madden, Ellen and Ajzen (1992) and Fitzmaurice (2005). Participants are more likely do to what others think they should if the person is important to them and/or the person’s opinion is valued. The first two statements are, “Most people who are important to me think that I should buy an item of clothing with this hangtag” and “Most people who are important to me approve of me buying an item of clothing with this hangtag on it”. Responses to these questions are known to have low variability because others (i.e. reference groups) are more likely to approve of desirable behaviors and disapprove of undesirable behaviors. Using descriptive norms, i.e. if the reference group themselves perform the behavior counteracts this. Therefore the last statement is “Most people who are important to me would buy an item of clothing with this hangtag”. These are all measured on a 7-point Likert scale from strongly disagree to strongly agree (Ajzen 2002a).

**Perceived Behavioral Control**

For this study, perceived behavioral control refers to the perceived behavioral control participants have towards purchasing the item the hangtag is on, based on the information on the hangtag. The goal is to capture participant’s confidence that they are capable of performing the behavior. The measurements are adapted from Ajzen (2002a), Madden, Ellen and Ajzen (1992) and Ajzen (2002b). There are three questions to
measure this variable, all on a 7-point Likert scale. The first question addresses the participants belief of the behavior’s controllability, i.e. if performing the behavior is up to them or not. It is “How much control do you have over buying an item of clothing with this hangtag on it?” (no control/complete control). The last two items measure the respondent’s self-efficiency in performing the behavior. They are “For me, buying an item of clothing with this hangtag on it would be: possible/impossible” and “If I wanted to, I could buy an item of clothing with this hangtag on it” (strongly agree/ strongly disagree) (Ajzen 2002a).

*Hangtags*

Hangtags were the final independent variables with three levels; effluent, recycling and control. Dummy variables were used to allow effluent to be compared to the control and to allow recycling to be compared to the control. The variables were measured using dummy variables. For effluent, the variable was coded as a 1 if the respondent saw the effluent hangtag and a 0 if they did not. For recycling, the variable was coded as a 1 if the respondent saw the recycling hangtag and a 0 if they did not. The control was coded the same, 1 if they saw the tag and 0 if they did not. The dummy variables allowed the variables to be coded numerically and for the variables to be compared to each other.

*Purchase Intention*

Purchase intention for this study is the participant’s intention to perform the behavior of purchasing an item. The first question was adapted from Hyllegar, Yan, Ogle and Lee (2012) and the second from Chen (2007), both measured on a 7-point Likert scale from definitely to definitely not. The first item was “If this hangtag was on an item
of clothing you were interested in purchasing, and it was priced at a price you were willing to pay, would you purchase this item?” The last two items, adapted from Chen (2007), ask “If clothing products with information about its factory’s environmental efforts were available in stores, I would tend to buy them” and “I would tell a friend about Anywear Clothing”. These scales reflect measuring purchase intention while accounting for an affordable price and product availability.

**Manipulation Check**

In order to determine the effectiveness of the stimuli, a manipulation check was conducted separately before the final data was collected. Data from 78 participants were analyzed with the expectation that adjustments to stimuli would be made, if warranted. Each participant was randomly exposed to one of the hangtags, with each hangtag being shown at least 24 times (the recycling tag was seen 30 times). Their responses were analyzed by comparing the mean difference through t-tests to check that participants who saw a hangtag with a message about water on it saw Anywear Clothing as more environmentally friendly than those who saw a hangtag with no information about water on it. This was based on a manipulation check by Hyllegard et al. (2012) who measured that when participates saw a hangtag with an environmentally friendly message on it, they viewed the company as more environmentally friendly than those who saw a hangtag without an environmentally friendly message. The questions and measurement were “Anywear Clothing engages in environmentally friendly production practices” and “Anywear Clothing uses water in an environmentally friendly way during production practices” strongly agree(1):strongly disagree(7). Table 1 shows the results.
<table>
<thead>
<tr>
<th>Table 1</th>
<th><strong>Means and t-tests for purchase intention</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anywear Clothing engages in environmentally friendly production practices.</strong> <em>Strongly agree:</em> <em>Strongly disagree</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td>Std. Deviation</td>
</tr>
<tr>
<td></td>
<td>Std. Error Mean</td>
</tr>
<tr>
<td></td>
<td>T</td>
</tr>
<tr>
<td></td>
<td>Df</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td></td>
<td>Mean Difference</td>
</tr>
<tr>
<td></td>
<td>Std. Error Difference</td>
</tr>
<tr>
<td><strong>Anywear Clothing uses water in an environmentally friendly way during production practices.</strong> <em>Strongly agree:</em> <em>Strongly disagree</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td>Std. Deviation</td>
</tr>
<tr>
<td></td>
<td>Std. Error Mean</td>
</tr>
<tr>
<td></td>
<td>T</td>
</tr>
<tr>
<td></td>
<td>Df</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td></td>
<td>Mean Difference</td>
</tr>
<tr>
<td></td>
<td>Std. Error Difference</td>
</tr>
</tbody>
</table>
It shows that the 30 participants who saw the tag with water recycling information on it saw Anywear Clothing on average as more eco-friendly, both over all and with water, than the 24 participants that saw tags with no ecological information on it. For both questions the findings were significant at <.000. It also shows that the 24 participants who saw the tag with water effluent information on it, on average, saw Anywear Clothing as more eco-friendly, both in general and in regards to water, than the 24 participants who saw a tag with no ecological information on it. The first question about general eco-friendly behaviors was significant at the .10 level (.068), and the question about eco-friendly water practices was significant at the .05 level. Changes were not made, given these results.

**Data Collection**

An online survey was used to gather data for the study. After receiving Institutional Review Board approval, participants were recruited through crowdsourcing on Amazing Mechanical Turk (AMT). AMT is an online program that allows researchers to access a wide range of consumers from the U.S. population. Paolacci, Chandler and Ipeirotis found that AMT worker demographics are as representative of the U.S. population in terms of gender, race, age and education as Internet samples and matches the population more closely than college undergraduate samples (2010). There is little evidence that the data collected through AMT is any poorer quality data than that from other subject pools (Krantz & Dalal, 2000; Gosling et al., 2004). Findings suggest that it is a viable alternative for data collection (Paolacci, Chandler & Ipeirotis 2010).

A total of 403 participants volunteered for this study. Each participant was exposed randomly to a treatment and each treatment was equally shown across all
participants. Participants were compensated $0.75 on successful completion of the entire survey. Before taking the survey, participants were shown a brief description of the study in a consent form. Participants were assured that this was a voluntary study, that they could withdrawal at any time, that it was anonymous and that there were no associated risks. They then had to check a box to confirm that they consented to participate and that they accepted the consent form information. The demographics were included at the end of the survey. This also included questions about their environmental involvement.

**Data Analysis Techniques**

Once that data were collected, it was analyzed using the Statistical Package for the Social Sciences (SPSS) software. Participants’ age, gender, employment, race/ethnicity, education, marital status, income, and environmental involvement were analyzed using frequencies and percentages. To test the hypotheses about the impact of eco-friendly water practices on purchase intention, t-tests and regression analysis were used. T-tests were used to compare the means of purchase intention for participants that saw the effluent or recycling hangtag and if those means were statistically significant. Regression was used to compare all five IVs to purchase intention. It showed the amount of each IV’s impact on purchase intention and if that impact was statically significant while holding all other factors constant.
CHAPTER V: RESULTS

Chapter V includes the following sections, (a) description of the sample, (b), t-test results, (c) regression analysis results, (d) summary of results.

Description of the Sample

This study used AMT to recruit 403 participants. All 403 participants completed the entire questionnaire and had usable responses. Tables 2 and 3 are charts of the respondents’ answers to the demographic questions. Half of the participants were between the ages 22-34 (55.3%) and almost ninety percent were between 22-54 (89.1%). Participants’ gender was close to evenly divided, with only ten percent more males (55.1%) than females (44.7%). It is difficult to compare the ratio of ethnic groups within the U.S. because the U.S. Census Bureau does not use Hispanic as an ethnicity, but it does estimate that 15.1% of the U.S. population is Hispanic. According to the U.S. census, the U.S. population consists of white 79.96%, black 12.85%, Asian 4.43%, American Indian and Alaska native 0.97%, native Hawaiian and other pacific islander 0.18% and two or more races 1.61% (U.S. Census 2013). For this study there was Caucasian 73.7%, Asian 10.2%, African American 7.9%, Hispanic 5% and other 3.2%. There were almost twice as many Asians and about five percent less African Americans, but overall ratios of ethnicities are similar to that of the U.S. population. Almost twice as many participants were unmarried (63%) than married (37%). Over seventy percent (73.2%) were college educated, but only about half were employed full-time (57.1%). The majority of participants (75.2%) made less than $70,000 a year. Lastly, participants were asked about their environmental concern. They were asked to rate on a scale of 1-7, 1 being strongly agree and 7 being strongly disagree, if they agree with the statements, “I
am concerned about the environment” and “I am concerned about the effect clothing production has on the environment.” For the first statement, over half of participants (59.3%) responded with a 1 (strongly agree) or a 2. For the second statement, only 39.2% responded with 1 or 2. An overview of the sample is shown in table 2 and the full description is shown after in table 3.

**Table 2**

*Demographics Overview*

<table>
<thead>
<tr>
<th>Total of 403 participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ages 22-34: 55.3%</td>
</tr>
<tr>
<td>Males: 55.1%, females: 44.7%</td>
</tr>
<tr>
<td>Unmarried: 63%, married: 37%</td>
</tr>
<tr>
<td>College educated: 73.2%</td>
</tr>
<tr>
<td>Full time employed: 57.1%</td>
</tr>
<tr>
<td>Made less than $70,000 a year: 75.2%</td>
</tr>
</tbody>
</table>

**Table 3**

*Demographics*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percentage</th>
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</thead>
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<td></td>
</tr>
<tr>
<td>18-21</td>
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<td>2</td>
</tr>
<tr>
<td>22-34</td>
<td>223</td>
<td>55.3</td>
</tr>
<tr>
<td>35-44</td>
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<td>45-54</td>
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<tr>
<td>55-64</td>
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<td>65 and Over</td>
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<tr>
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<td>Female</td>
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<td>Prefer not to disclose</td>
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<td>.2</td>
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<td>Ethnicity</td>
<td>Count</td>
<td>Percentage</td>
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<td>Other</td>
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<table>
<thead>
<tr>
<th>Marital Status</th>
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<th>Percentage</th>
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<tbody>
<tr>
<td>Married</td>
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<tr>
<td>Unmarried</td>
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<tr>
<th>Education Level</th>
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<tr>
<td>Less than high school</td>
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<td>Graduate School</td>
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<table>
<thead>
<tr>
<th>Occupation</th>
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<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student</td>
<td>36</td>
<td>8.9</td>
</tr>
<tr>
<td>Part-Time employed</td>
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<td>16.9</td>
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<tr>
<td>Full-time employed</td>
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<tr>
<td>Retired</td>
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<td>2.7</td>
</tr>
<tr>
<td>Not employed</td>
<td>58</td>
<td>14.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Annual Income</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than $10,000</td>
<td>31</td>
<td>7.7</td>
</tr>
<tr>
<td>$10,000-$29,999</td>
<td>87</td>
<td>21.6</td>
</tr>
<tr>
<td>$30,000-$49,999</td>
<td>113</td>
<td>28</td>
</tr>
<tr>
<td>$50,000-$69,999</td>
<td>72</td>
<td>17.9</td>
</tr>
<tr>
<td>$70,000-$89,999</td>
<td>54</td>
<td>13.4</td>
</tr>
<tr>
<td>$90,000-$149,999</td>
<td>38</td>
<td>9.4</td>
</tr>
<tr>
<td>$150,000 or above</td>
<td>8</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I am concerned about the environment.</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree(1):</td>
<td>146</td>
<td>36.2</td>
</tr>
<tr>
<td>Strongly disagree(7):</td>
<td>93</td>
<td>23.1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I am concerned about the effect clothing production has on the environment.</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree(1):</td>
<td>85</td>
<td>21.1</td>
</tr>
<tr>
<td>Strongly disagree(7):</td>
<td>65</td>
<td>16.4</td>
</tr>
</tbody>
</table>

37
T-Test Results

Two t-tests were run to test for the effect of both hangtags on purchase intention. The results for the t-tests are shown in table 4. The first t-test looked at participants who saw the recycling hangtag to those that saw the control hangtag. Purchase intention for the recycling hangtag had a mean of 2.47 and the control hangtag had a mean of 2.93. The t-test indicated a statistically significant difference between the recycling hangtag and the control hangtag for purchase intention \([F(1,269)=2.136, p<.001]\). The t-test looking at the hangtag with effluent information compared to the control hangtag had similar results. The purchase intention for the effluent hangtag had a mean of 2.48 while the purchase intention for the control hangtag had a mean of 2.93. The t-test indicated a statistically significant difference between the effluent hangtag and the control hangtag for purchase intention \([F(1,266)=1.925, p<.005]\).

<table>
<thead>
<tr>
<th>Strongly disagree(7)</th>
<th>6</th>
<th>30</th>
<th>7.4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7</td>
<td>19</td>
<td>4.7</td>
</tr>
</tbody>
</table>

*Note.* Total number of participants = 403

<table>
<thead>
<tr>
<th>Table 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Means and t-tests for purchase intention</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Recycling Hangtag</th>
<th>Control Hangtag</th>
<th>Effluent Hangtag</th>
<th>Control Hangtag</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>135</td>
<td>136</td>
<td>132</td>
<td>136</td>
</tr>
<tr>
<td>Mean*</td>
<td>2.47</td>
<td>2.93</td>
<td>2.48</td>
<td>2.93</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>1.151</td>
<td>1.130</td>
<td>1.169</td>
<td>1.130</td>
</tr>
<tr>
<td>Std. Error Mean</td>
<td>.099</td>
<td>.097</td>
<td>.102</td>
<td>.097</td>
</tr>
<tr>
<td>T</td>
<td>-3.317</td>
<td></td>
<td>-3.251</td>
<td></td>
</tr>
<tr>
<td>Df</td>
<td>269</td>
<td></td>
<td>266</td>
<td></td>
</tr>
</tbody>
</table>

38
Regression Analysis Results

A regression analysis was run to compare all independent variables (IVs) to the dependent variable (DV) while holding other factors constant. It was run with purchase intention as the dependent variable and attitude, subjective norm, perceived control, effluent hangtag, and recycling hangtag as the independent variables. Results can be seen in table 5. The regression showed statistical significance for attitude, subjective norm, and perceived control. Attitude was hypothesized to be positively related to purchase intention. On average, and holding other factors constant, a one unit change in attitude resulted in a .515 unit change in purchase intention in the same direction. Thus, purchase intention increases as attitude increases. Subjective norm was hypothesized to be positively related to purchase intention. For subjective norm on average, and holding other factors constant, a one unit change resulted in a .222 unit change in purchase intention in the same direction. Lastly, perceived control was hypothesized to be positively related to purchase intention. On average, and holding other factors constant, a one unit change in perceived control resulted in a .152 unit change in purchase intention. The effluent and recycling hangtags were not statistically significant to purchase intention, so they will not be discussed.
Table 5

Ordinary Least Squares Regression, Purchase Intention, Dependent

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>Std. Error</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>.123</td>
<td>.177</td>
<td>.694</td>
<td>.488</td>
</tr>
<tr>
<td>Attitude</td>
<td>.515</td>
<td>.054</td>
<td>9.565</td>
<td>.000</td>
</tr>
<tr>
<td>Subjective Norm</td>
<td>.222</td>
<td>.043</td>
<td>5.187</td>
<td>.000</td>
</tr>
<tr>
<td>Perceived Control</td>
<td>.152</td>
<td>.040</td>
<td>3.836</td>
<td>.000</td>
</tr>
<tr>
<td>Effluent</td>
<td>.054</td>
<td>.110</td>
<td>.485</td>
<td>.628</td>
</tr>
<tr>
<td>Recycle</td>
<td>-.067</td>
<td>.109</td>
<td>-.610</td>
<td>.542</td>
</tr>
</tbody>
</table>

$R^2 = .458$, Adjusted $R^2 = .452$

Summary of Results

Table 6 shows the summary of the results. The water effluent tag having a positive effect on purchase intention was supported with the t-test but the regression failed to support it, so $H1$ was partially supported. The water recycling hangtag having a positive effect on purchase intention was supported by the t-test but the regression failed to support it, so $H2$ was partially supported. In the regression analysis attitude had a significant positive effect on purchase intention so $H3$ was supported. The regression analysis showed that subjective norm had a significant positive effect on purchase intention so $H4$ was supported. The regression analysis showed that perceived control had a positive effect on purchase intention so $H5$ is supported.
<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>H1:</strong> Tags with water effluent information compared to tags with no</td>
<td>T-Test: Supported</td>
</tr>
<tr>
<td>information will positively influence consumers’ purchase intention.</td>
<td>Regression: Not Supported</td>
</tr>
<tr>
<td><strong>H2:</strong> Tags with water recycling information compared to tags with no</td>
<td>T-test: Supported</td>
</tr>
<tr>
<td>information will positively influence consumers’ purchase intention.</td>
<td>Regression: Not Supported</td>
</tr>
<tr>
<td><strong>H3:</strong> Attitude will be positively related to purchase intention.</td>
<td>Supported</td>
</tr>
<tr>
<td><strong>H4:</strong> Subjective norms will be positively related to purchase intention.</td>
<td>Supported</td>
</tr>
<tr>
<td><strong>H5:</strong> Perceived control will be positively related to purchase intention.</td>
<td>Supported</td>
</tr>
</tbody>
</table>
CHAPTER VI: CONCLUSION

Chapter VI includes the following sections, (a) summary of the study, (b) discussion of major findings, (c) contributions and implications, (d) limitations and scope of future research.

**Summary of the Study**

The apparel industry is one of the largest industries in the world and its biggest pollutant is water pollution. As a whole, the apparel industry takes in a lot of water, sometimes more than the environment can handle, and releases a lot of polluted water (Hoekstra et al. 2012). Out of agricultural, industrial and domestic water usage rates, it is estimated that industrial water use will show the biggest increase of about 76% from 1995 to 2025 (Cardone 2004). Textile production uses fresh water for filtering, retting, starching, desizing, scouring, bleaching, dyeing, washing, neutralization, and salt bath processes (Liu et at. 2012). Informing consumers about the negative impacts the industry can have on water may influence them to purchase more eco-friendly clothing products. Research shows that consumers are more likely to get apparel that has a reduced environmental impact when they understand how apparel products affect the environment (Hustvedt & Dickson 2009; Stephens 1985). One way that companies communicate their environmental involvement with consumers is through hangtags (Jana 2007). This study sought to see if informing consumers through hangtags about a company’s environmental efforts in terms of water usage would affect their purchase intention. The following hypotheses were created for testing.

H1: Tags with water effluent information compared to tags with no information will positively influence consumers’ purchase intention.
H2: Tags with water recycling information compared to tags with no information will positively influence consumers’ purchase intention.

H3: Attitude will be positively related to purchase intention.

H4: Subjective norms will be positively related to purchase intention.

H5: Perceived control will be positively related to purchase intention.

Participants were recruited using Amazon Mechanical Turk (AMT). There were 403 respondents and all of their data was used in the analysis. The data were analyzed using t-tests and regression analysis. Participants included a wide range of ages and ethnicities, and included both males and females.

Discussion of the Major Findings

The t-test run for purchase intention for the effluent hangtag and control hangtag showed a statically significant difference. Participants who saw the recycling hangtag had a significantly higher purchase intention than those that saw the control tag. Hypothesis 1 was supported based on this t-test.

The t-test for the recycling hangtag and control hangtag for purchase intention showed a significant difference. Participants that viewed the effluent hangtag showed to be more likely to purchase the item that the hangtag was on than those that saw the control tag. Hypothesis 2 was supported based on this t-test.

A regression was run that included attitude, subjective norm, perceived control, effluent and recycling as the independent variables. The dependent variable was purchase intention. Through the regression analysis, participants’ attitude towards purchasing the item with the hangtag is shown to have a significant effect on their purchase intention for the item. This supports hypothesis 3. The regression also showed that subjective norm
was significant. Participants’ views on whether those people that are important to them would approve/buy the item the hangtag was on was found to have a significant impact on their purchase intention. This supports hypothesis 4. Perceived control was also found to be significant. For participants, feeling that they had high control over purchasing the item the hangtag had a significant influence on their purchase intention. This supports hypothesis 5. All three of these are supported through the theory of planned behavior, which says that each variable will influence purchase intention.

The two variables that did not have a statistically significant impact on purchase intention were the effluent and recycling hangtags. This says that viewing the hangtag did not affect the participants’ purchase intention when the other variables were taken into account. Thus, hypothesis 1 and 2 were not supported by the regression results. There was a statistically significant difference in the t-test because the other factors were not taken into account like they were in the regression. This suggests that the other variables are the more important factors in determining purchase intention.

**Contributions and Implications**

Purchasing an item is not as simple as a consumer seeing one they like and then deciding to purchase it. As stated earlier, the theory of planned behavior says that they must have a positive attitude, have a positive subjective norm and feel that they have control of purchasing the item. The results show that attitude, subject norm, and perceived control all had significant effects on purchase intention. Viewing the tag did not have a direct effect on purchase intention when these factors were considered. Thus, affecting consumers’ attitudes, subjective norm and perceived control is essential.
Knowing that viewing a hangtag with information about wastewater effluent and recycling has a positive effect on participants, based on the t-tests, is important. Companies only want to put information on hangtags if they know it will be effective. Companies like Levi’s and Patagonia are already starting to tell consumers about their eco-friendly water treatments and hopefully, knowing that it is effective, the trend will continue to grow. It is important that consumers are exposed to this information so that they will become more aware of industrial water management. The first step to addressing a problem is to get people talking about it. Hangtags may be an effective way to inform consumers about water treatment techniques.

This research also fills in the gap of research on eco-friendly apparel and water quality. In research there is a large disconnect between apparel and science but in practice there is a big overlap. Starting to bring the two topics together is important for education. It is important to include lessons on sustainable production in an apparel program’s curriculum. Students studying apparel, especially those focusing on production, sourcing and/or design, need to be aware of what is going on in factories and what impact their choices are making. A designer need to know if the fabric or dye they choose for a product needs excessive water or uses harmful chemicals. If an apparel worker visits a factory, he/she needs to know how to judge the factory’s claims on whether it properly treats its effluent. The fashion world has gone without this knowledge for too long and ignorance on these topics will cause irreparable environmental harm. Just because the wastewater leaving the factory is clear does not mean that it is clean, and just because using excessive amounts of water isn’t costing more doesn’t mean it isn’t harmful to the
environment. Bringing science and apparel together through research in a way that applies to apparel workers is important to the future of the industry and the planet.

**Limitations and Scope of Future Research**

One of the limitations with this study is that it only looked at hangtags. There are many ways that companies communicate with their customers. Some of the other ways are through their website/online ordering, social media, in-store signs, commercials and print ads. Future studies could look at it from a marketing perspective to expand on how consumers react to the information. Also, with online shopping growing as it is, fewer consumers see a hangtag before buying a product. On websites customers may read a product description instead of a hangtag. These descriptions can be a few words to a few paragraphs and can contain a wide variety of information, from fiber content to the inspiration behind the design. Many websites have reviews and rating systems, e.g. a 1-5 star rating for their products that customers can also read before purchasing a product. Doing researching using websites therefore could also expand the study.

Another limitation is that it only looked at a consumer’s purchase intention without accounting for other factors that are in play during actual shopping scenarios. This includes price, quality, style, and circumstance. In an actual shopping scenario a consumer would not view a hangtag while shopping on a computer; they only see hangtags in the store. Being in a store has a different set of circumstances and many other factors in play that are not there when viewing the tag online. Future studies could use a physical hangtag in a more realistic shopping scenario. Other studies could also include factors like price, quality and style to see how they also would affect the purchase intention.
A third limitation is that only wastewater recycling and effluent were reviewed. Wastewater recycling and effluent were the focus because they are relatively simple to understand and represents actions already taken by factories. There are many other aspects of water used in apparel production that could be looked at as well. There are new techniques that can use less water, down to no water at all, for dyeing and finishing. A factory’s gray water footprint is the amount of water required to dilute pollutants in wastewater discharge to the point that the water quality reaches the agreed water quality standards (Hoekstra 2011). These are things that future research could also look into to see if they would be greater, or less, of an influence to purchase an item.

The study also had a wide range of respondents. It could be interesting for future studies to compare different groups. Different generations have different shopping habits and priorities so comparing different age groups could show some differences. Also looking at different knowledge levels about water and/or the environment that participants have could show differences.
REFERENCES


APPENDIX A

SURVEY INSTRUCTIONS
RECRUITMENT SCRIPT

The primary goal of this research is to investigate your purchase intention toward an apparel item based on the information on a hangtag. A picture of a hangtag will be shown to you and you will be asked questions about it. Your participation will help apparel brands better understand the most effective information to be put on a hangtag. Participation in this study is totally voluntary. You need to be 18 years of age or above and will be compensated for your participation but may withdrawal at anytime without penalty. It should take approximately 10 minutes to complete.

Primary Investigator: Katherine Brewster kmbcp5@mail.missouri.edu
CONSENT FORM

Description and Explanation of Procedures:

The primary goal of this research is to investigate your purchase intention toward an apparel item based on its hangtag. A picture of a hangtag will be shown to you and you will be asked questions about it. Your participation will help apparel brands better understand the most effective information to be put on a hangtag. It should take approximately 10 minutes to complete the survey.

Participation in this study is totally voluntary and you may quit at any time. Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled.

Confidentiality:

Data for the survey will be saved anonymously. Electronic files will be saved with numeric codes with no personal identifiers. Throughout the survey, if you feel uncomfortable with any question, you may stop participating at any time with no penalty.

Risks and Benefits:

There are no physical or psychological risks in participating in the survey. The study will benefit society, as apparel brands will have a better understanding of what information to put on hangtags.

Compensation:

You will be compensated for this survey and may skip any question or withdrawal from the survey at any time without penalty.

Consent:

_______ By checking this box, you confirm your age as 18 years or above, and your consent to participate in this study.
SURVEY

The hangtag shown below is for a company called Anywear Clothing that sells clothing for men and women at affordable prices.

Please use the hangtag below to answer the questions in this section.

Hangtag 1: Recycling

[Each participant viewed one tag shown at random]
For me, purchasing an item of clothing with this hangtag on it would be

<table>
<thead>
<tr>
<th>pleasant</th>
<th>● ● ● ● ●</th>
<th>unpleasant</th>
</tr>
</thead>
<tbody>
<tr>
<td>harmful</td>
<td>● ● ● ● ●</td>
<td>beneficial</td>
</tr>
<tr>
<td>good</td>
<td>● ● ● ● ●</td>
<td>bad</td>
</tr>
<tr>
<td>worthless</td>
<td>● ● ● ● ●</td>
<td>valuable</td>
</tr>
<tr>
<td>enjoyable</td>
<td>● ● ● ● ●</td>
<td>unenjoyable</td>
</tr>
</tbody>
</table>

Most people who are important to me think that I should buy an item of clothing with this hangtag.

| Strongly agree | ● ● ● ● ● | Strongly disagree |

Most people who are important to me approve of me buying an item of clothing with this hangtag on it.

| Strongly agree | ● ● ● ● ● | Strongly disagree |

Most people who are important to me would buy an item of clothing with this hangtag.

| Strongly agree | ● ● ● ● ● | Strongly disagree |

How much control do you have over buying an item of clothing with this hangtag on it?

| Absolutely no control | ● ● ● ● ● | Complete control |

Anywear Clothing engages in environmentally friendly production practices.

| Strongly agree | ● ● ● ● ● | Strongly disagree |

Anywear Clothing uses water in an environmentally friendly way during production practices.

| Strongly agree | ● ● ● ● ● | Strongly disagree |
Please answer the following demographic questions.

I am concerned about the environment.

Strongly agree  ○ ○ ○ ○ ○ ○ ○  Strongly disagree

I am concerned about the effect clothing production has on the environment.

Strongly agree  ○ ○ ○ ○ ○ ○ ○  Strongly disagree

What is your age?

○ 18-21
○ 22-34
○ 35-44
○ 45-54
○ 55-64
○ 65 and Over

What is your gender?

○ Male
○ Female
○ Prefer not to disclose
What is your race/ethnicity?

- Caucasian, non-Hispanic
- African-American
- Hispanic
- Asian
- Other

What is your marital status?

- Married
- Unmarried

What is the highest level of education you have completed?

- Less than high school
- High school
- College
- Graduate School

Occupation

- Student
- Part-time employed
- Full-time employed
- Retired
- Not employed
Thank you for taking part in this study. Your validation code for mTurk is
${e://Field/mTurkCode} PLEASE PRESS ON THE CONTINUE BUTTON ONE
MORE TIME TO RECORD RESPONSES.
Hangtag 2: Effluent

Anywear Clothing

This product was made at a factory that complies with US water quality standards to keep streams and rivers clean.

Size: M
Style: T5968R3
Color: White
Style: Knitwear
Hangtag 3: Control

Anywear Clothing

Size: M
Style: T5968R3
Color: White
Style: Knitwear
October 15, 2015

Principal Investigator: Katherine Maye Brewster
Department: Textile and Apparel Mgmt

Your Exempt Application to project entitled A QUANTITATIVE ANALYSIS OF THE EFFECT OF HANGTAGS ON CONSUMER PURCHASE INTENTION FOR APPAREL was reviewed and approved by the MU Institutional Review Board according to terms and conditions described below:

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<th>IRB Project Number</th>
<th>2003434</th>
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</thead>
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<tr>
<td>IRB Review Number</td>
<td>207506</td>
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<tr>
<td>Initial Application Approval Date</td>
<td>October 15, 2015</td>
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<tr>
<td>IRB Expiration Date</td>
<td>October 15, 2016</td>
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<tr>
<td>Level of Review</td>
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<td>Project Status</td>
<td>Active - Open to Enrollment</td>
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<tr>
<td>Exempt Categories</td>
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</tr>
</tbody>
</table>

The principal investigator (PI) is responsible for all aspects and conduct of this study. The PI must comply with the following conditions of the approval:

1. No subjects may be involved in any study procedure prior to the IRB approval date or after the expiration date.
2. All unanticipated problems, adverse events, and deviations must be reported to the IRB within 5 days.
3. All changes must be IRB approved prior to implementation unless they are intended to reduce immediate risk.
4. All recruitment materials and methods must be approved by the IRB prior to being used.
5. The Annual Exempt Form must be submitted to the IRB for review and approval at least 30 days prior to the project expiration date. If the study is complete, the Completion/Withdrawal Form may be submitted in lieu of the Annual Exempt Form.
6. Maintain all research records for a period of seven years from the project completion date.
7. Utilize all approved research documents located within the attached files section of eCompliance. These documents are highlighted green.

If you have any questions, please contact the IRB at 573-882-3181 or irb@missouri.edu.

Thank you,
MU Institutional Review Board