The impact of social networking site engagement on consumer's knowledge of textile and apparel environmental sustainability: A Facebook experiment

by

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Abstract

The Textile and Apparel (TA) industry has become increasingly criticized for its massive environmental pollution through unsustainable production and distribution. In addition, key stakeholders are equally recognizing the need for cleaning up the industry. However, TA manufacturers, brands, and retailers need to be more aware of the necessity of sustainable production and distribution. At the same time, TA consumers need to be more aware of the necessity of sustainable consumption, care, and disposal of clothing.

The purpose of this study was to investigate whether social networking sites (SNS) have any potential to increase consumer awareness of TA-related environmental sustainability issues. The specific research objectives were to investigate 1) whether engagement with TA-related environmental information in a SNS platform (i.e., Facebook) enhanced participants' knowledge of TA environmental sustainability issues; 2) which format of TA-related environmental information sharing stimulated a higher level of SNS engagement and greater knowledge change; and 3) which content of TA-related environmental information sharing stimulated a higher level of SNS engagement and greater knowledge change.

One group pretest-posttest experimental design was used, and mixed method approach was employed. Participants responded to a study-specific textile and apparel environmental sustainability knowledge (TAESK) scale before and after a Facebook experiment. The experiment included engaging with TA environmental information for a two-week period in a Facebook page. The researcher was the creator and administrator of the page. Quantitative data analysis included descriptive statistics, the Wilcoxon Signed-Ranks test, and multiple regression analysis. Qualitative analysis included conventional content analysis techniques.

Findings from Wilcoxon Signed-Ranks test indicated that the experiment increased participants' knowledge of TA environmental sustainability significantly ($Z= -5.274$, $p< 0.001$). Descriptive statistics revealed that video and infographic-type posts stimulated greater participants engagement than weblink (i.e., text based) posts. Likewise, participants were engaged with water and waste-related content of TA environmental sustainability more so than chemical and energy related content. However, the multiple regression analysis which was employed to identify the weighted influence of different formats and content of TA environmental sustainability information towards knowledge gain, provided limited information.

This exploratory study provided some support for the usefulness of incorporating SNSs as part of an educational strategy by TA brands and policymakers advocating for sustainable TA production and distribution. Such a strategy may be one way to increase consumer awareness. Also, the findings of this study may motivate TA educators to weigh the potential of SNSs in teaching and learning activities related to TA sustainability issues.

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List of Definitions

Attitude: "A learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object" (Ajzen & Fishbein, 1975, p.6).

Big Data Analytics: "…the process of examining large data sets, i.e., big data, to uncover hidden patterns, unknown correlations, market trends, customer preferences, and other useful business information" (Rouse, 2014, intro). The analytical findings can lead to new revenue opportunities, more effective marketing, better customer service, improved operational efficiency, and competitive advantages over rivals" (Rouse, 2014, para. 1).

Carbon Footprint: The total greenhouse gas emissions caused directly and indirectly by a person, organization, event, and product measured in carbon dioxide equivalent (CO2e) (Carbon Trust, 2007).

Electronic Word of Mouth (eWOM): "Any positive or negative statement made by potential, actual, or former customers about a product or company, which is made available to a multitude of people and institutions via the Internet" (Hennig-Thurau, Gwinner, Walsh, & Gremler, 2004, p. 39).

Environmentally Sustainable Apparel (ESA): Apparel manufactured, distributed, and consumed in a way which does not deplete or destroy natural resource (air, water etc.) permanently (Walter, 2009).

Fast Fashion: "… a business strategy which aims to reduce the processes involved in the buying cycle and lead times for getting new fashion product into stores, in order to satisfy consumer demand at its peak" (Barnes, & Lea-Greenwood, 2006, p. 259).

Greenhouse gases (GHG): Atmospheric gases occurring naturally, or human induced which are deemed responsible for greenhouse effect. Few such gases are- carbon dioxide, methane, water vapor, nitrogen di oxide etc.

Infographic: "An infographic (information graphic) is a representation of information in a graphic format designed to make the data easily understandable at a glance" (Rouse, 2012, para. 1).

Social Media: "…a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content" (Kaplan & Haenlein, 2010, p. 61).

Social Networking Sites: "… applications that enable users to connect by creating personal information profiles, inviting friends and colleagues to have access to those profiles, and sending e-mails and instant messages between each other" (Kaplan & Haenlein, 2010, p. 63).

Social Networking Site (SNS) Engagement: SNS engagement can be defined as "… collection of experiences" relating to "…consumer's beliefs about how a site fits into his/her life" (Calder, Malthouse, & Schaedel, 2009, p. 322). This engagement, in turn, might reflect by either the frequent use of SNS or change in action, causing someone "to want to visit it, download its pages, be attentive to it, recommend it to a friend, or be disappointed if it were no longer available" (Calder et al., 2009, p. 322). If they get engaged with SNS promoting something, they would want to communicate that with others (Paek, Hove, Jung, & Cole, 2013). In this study, the word 'engagement' and 'interaction' was used interchangeably and carried the same meaning.

Textile and Apparel Industry (TA): The industry which involves production, distribution, and sale of apparel and textile products.

Textile and Apparel Supply Chain: "A series of interrelated activities which originates with manufacture of fibers and culminates in the delivery of a product into the hands of the consumers" (Jones, 2006, p. 1).

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Chapter 1 - Introduction

Background of the Study

The global textile and apparel (TA) industry is one of the major industries of the world with an estimated market size of US $830 billion in 2017 (MarketLine, 2015). The TA supply chain is very complex and requires numerous operations to make a finished product. All these operations use a high level of energy (Draper, Murray, & Weissbrod, 2007; Islam, Patwary, & LeHew, 2017) and chemicals (Jackson, 2014; Kant, 2012); enough to make the TA industry the second-most polluting industry of the world (Sweeny, 2015).

Today's fast fashion trends, which are characterized by low cost, low predictability, high-impulse purchases, a shorter life cycle, and high volatility of market demand (Fletcher, 2008; Sparks & Fernie, 2004), have driven the industry to produce more products and encourage consumers to increase their consumption (Bhardwaj & Fairhurst, 2010). Consumers like to buy a high number of low quality, fashionable apparel with low price tags (Crewe & Davenport, 1992). More than 150 billion garments are produced annually which is equal to providing 20 new garments to every person on the planet (Conca, 2015). At the same time, brands and retailers strive to churn out cheap clothes to gain a competitive advantage. Unfortunately, producing cheap clothing is usually associated with an unsustainable means of production. Added to this, frequent shifts in fashion trends make fast fashion clothes obsolete very quickly (Kunz, 2010), leading consumers to dump the clothes quickly (Jackson, 2014). For example, Americans throw away about 82 lbs. of clothing per person every year (Conca, 2015; CTR, 2018; Jackson, 2014), of which 85% ends up in either landfills or incinerators (Jackson, 2014).

Clothing items used for longer periods creates another environmental dilemma. Numerous research studies show that product care, in the consumer use phase that includes

laundering, drying, ironing, and other maintenance processes, is the largest energy consuming stage in the TA life cycle for certain fibers, accounting for nearly 39% of the greenhouse gas emissions of the industry (Allwood, Laursen, Malvido de Rodríguez, & Bocken, 2006; Cullen & Allwood, 2009; Yamaguchi, Seii, Itagaki, & Nagayama, 2011; Yun, Patwary, LeHew, & Kim, 2017). Therefore, it is clearly understandable that from the processing of the raw materials to the final disposal of textile products, every single step, if not chosen wisely, impacts the carbon footprint of the industry. Sadly, the TA industry currently contributes 10% of global greenhouse gas emissions (Caniato, Caridi, Crippa, & Moretto, 2012; Conca, 2015; Fletcher, 2008), second only to the oil industry (Sweeny, 2015).

Some of the key players of TA supply chain are brands, retailers, manufacturers, consumers, and policy makers, etc. The interplay of these groups shapes the culture of the industry that we observe today. It is difficult to bring a desired change to the industry without involving all parties that play a role in the industry. Even initiatives to reduce carbon footprint of the industry by brands, retailers, manufacturers, as well as policy makers, might not bring desired success without active participation of consumers. For example, there is little incentive for a brand to produce sustainable apparel if consumer demand is low. On the other hand, continuing to produce apparel using unsustainable processes and materials will hamper a brand's competitive edge in the market if mainstream consumers display high demand for sustainably-made apparel. Simply put, consumers hold greater power than ever to influence businesses because of the rise of social media and big data analytics (Shockley, 2017). They spread and seek relevant product information over social media as well as justify their decision from social media comments and reviews (Park & Cho, 2012; Kozinets, 2002).

Apparel brand and retail companies gather a massive amount of data from consumers' social media activities (i.e., blogs, podcasts, wikis, social networking sites etc.) and analyze sentiment and behavioral patterns using that data (Flavián & Guinalíu, 2005). By utilizing insights from those analyses, brands bring new products into the market (Lobo, 2017). For example, Nordstrom follows product trend in Pinterest and utilize that data to increase in-store sales (Reddy, 2015). Target plans to set up its own 'data analytics center' for analyzing consumers' social media data to bring about more personalized products into the market (Reddy, 2015). As a result, consumers are becoming more powerful in expressing their product preferences through social media electronic word of mouth (eWOM).

In the context of the TA industry, consumers directly contribute to environmental problems by purchasing products which are made using unsustainable materials and processes and then care for their clothes using unsustainable laundering practices. Consumers also indirectly deepen environmental harms by increasingly consuming cheap and easy throwaway clothes and accelerating the spread of the fast fashion paradigm. This seemingly typical trend of apparel consumption, caring, and disposal behavior might be influenced by social media usage directly or indirectly. The reason for this is that Social Networking Site (SNS) community members frequently discuss apparel shopping on these media (Boyd Thomas, Okleshen Peters, & Tolson, 2007). During discussion, it is highly likely that they might reflect on the pros and cons of the product and their future expectations of the product features. By monitoring this type of SNS discussion, apparel retailers can directly gain consumer opinions about their products (Boyd Thomas et al., 2007) and update product features. From this point of view, consumers' awareness of the unsustainable nature of the industry is important. If more and more consumers become aware of the TA industry's environmental impact, chances are high that the awareness will

spread through social media which, in turn, will attract the attention of thousands more consumers.

Unsurprisingly, consumers demonstrate a low level of environmental knowledge related to TA production and consumption (Anaya, 2010; Bhaduri & Ha-Brookshire, 2011; Hiller Connell, 2010; Phau & Ong, 2007; Wang, 2016). Lack of knowledge of TA environmental sustainability may act as a barrier towards both sustainable purchasing (Hiller Connell, 2010; Jin Gam, 2011) and sustainable consumption (Thøgersen, 2000). If consumers become aware of environmental sustainability issues of the TA industry and are committed to more responsible purchasing, use, and disposal habits, it might create increased demand for Environmentally Sustainable Apparel (ESA) (Reiter, 2015). Knowledgeable apparel purchasers have the potential to drive the TA industry towards a sustainable path because consumers who feel that they have an impact on the environment might engage in more responsible behavior (Roberts, 1996; Straughan & Roberts, 1999), in their purchasing decisions, care, and disposal phase in the case of TA consumers.

Today, the TA industry is recognizing the need for adopting sustainable strategies as related to efficiency and cost savings. However, mainstream consumers unaware of more sustainable processes and products, and perhaps current advocates of fast fashion do not provide sufficient impetus to the industry to produce sustainable products. Therefore, increased consumers' environmental awareness related to TA might stimulate increased demand for ESA (Reiter, 2015) and become a vital driving force for the industry to produce apparel with more sustainable characteristics through adopting more sustainable processes. In this perspective, social media can play a significant role in enhancing consumer awareness due to its increased popularity.

As of January 2018, the number of active social media users was 3.20 billion among 4.02 billion internet users (Chaffey, 2018). SNSs are unique social media platforms and their structure focuses on information sharing abilities. In SNS platforms, users can easily access information as well as see comments and replies from other users about that information. Collectively, accessing the information, reading others' viewpoints, and expressing personal opinions might have greater effect on the attitude and behavior of the consumers. Currently, consumers are increasingly seeking information from SNSs to base their decisions (Kozinets, 2002). They monitor their peers' social media interests and follow peers' consumption styles (Leavitt, 2005). At the same time, they tend to collect information from various social media sources to determine their apparel purchasing decision (Park & Cho, 2012). In addition to utilizing online platforms such as social networks, blogs, podcasts, and Wikis, etc., they also contact other consumers in the quest of more objective information (Kozinets, 2002). On the other hand, most of the apparel brands and retailers have their own Facebook fan pages (Socialbakers, 2016) and are keen to disseminate their own sustainability initiatives among the consumers (Cardamenis, 2015). As both groups, apparel brands/retailers and consumers, are interacting (i.e., disseminating and seeking info.) in the same platform, it is imperative to investigate how consumers' interactions with TA environmental information over SNS spaces impact their knowledge of the issue.

Statement of the Problem

Textile and apparel manufacturing, distribution, and consumption have been causing substantial damage to the environment (Allwood et al., 2006; Conca, 2015; Fletcher, 2008; Jackson, 2014; Sweeny, 2015). Being a major player of the TA supply chain, consumers make the problem worse by participating in irresponsible purchasing, consumption, and disposal behavior. Lack of knowledge is said to be one of the barriers to making the right apparel purchasing decisions and consumption (Hiller Connell, 2010; Jin Gam, 2011) because consumers who feel that they may have positive impact on environmental issues might engage in more responsible behavior (Roberts, 1996; Straughan & Roberts, 1999). In other words, lack of TA-related environmental knowledge of consumers (Phau & Ong, 2007; Wang, 2016) might be one of the key factors behind today's limited demand for ESA. Therefore, consumers' knowledge of the environmental impacts of TA manufacturing and consumption is important. As Claudio (2007) suggested, consumers' awareness of the impact of clothing on the environment is "the best hope for sustainability in the fashion industry" (p. A454). This study conducted an investigation to see whether consumers' TA-related environmental awareness (e.g., knowledge) can be improved by SNS interaction.

Purpose of the Study

The purpose of the study was to investigate whether engaging with TA-related environmental information within a Social Networking Site (SNS) platform (i.e., Facebook) contributed to enhanced knowledge of TA-related environmental sustainability issues. In addition, the study examined which format of information sharing over the SNS platform stimulated a higher level of engagement and greater knowledge increase. Likewise, the study investigates which specific content of TA-related environmental information sharing over the SNS platform stimulated higher level of engagement and greater knowledge increase. The specific objectives of the research study were:

1. To investigate whether engagement with TA-related environmental information in a SNS platform (i.e., Facebook) enhanced participants' knowledge of TA environmental sustainability issues.
2. To investigate which format of TA-related environmental information sharing leads to higher level of SNS engagement and greater knowledge enhancement of the participants.
3. To investigate which content of TA-related environmental information sharing leads to higher level of SNS engagement and greater knowledge enhancement of the participants.

Justification of the Study

Today's highly fragmented (e.g., scattered globally) TA industry has been criticized heavily in recent years due to its labor-exploiting (Scott, 2006), energy consuming (Draper et al., 2007) and polluting nature (Caniato, Caridi, Crippa, & Moretto, 2012; Conca, 2015; Fletcher, 2008). Therefore, it is very crucial for the industry to produce textile and apparel products sustainably. Seemingly, an increasing number of apparel brands and retailers have been working on solutions for greater sustainability, and policy makers are attempting to incentivize such initiatives in the TA industry. In the same line of effort, consumers can be another vital driving force for encouraging the TA supply chain to become more sustainable. If consumers do not become more conscious about sustainability issues and accept their role in the problem and solution, industry progress toward sustainability might be hindered significantly.

Considering the power of today's social media connecting both consumers and retailers within the same platform, it is important to determine whether SNSs have the potential to improve the knowledge of the TA environmental sustainability issue. The reason for this is that environmental knowledge might subsequently impact consumers' attitudes toward the issue and contribute to greater ESA purchase intentions. Previous research studies have investigated the impact of social media on the TA industry. For example, studies have investigated the impact of social media on the fashion week attendee's views about fashion (Mohr, 2013), apparel purchasing decisions (Bilal, Ahmed, & Shahzad, 2014; Nasir, Vel, & Mateen, 2012), and purchase intention of ESA (Reiter, 2015; Xiaofen & Yiling, 2009). Other lines of studies have investigated how social media can be utilized in variety of purposes, such as fundraising (Seo, Kim, & Yang, 2009; Smitko, 2012), volunteer recruiting (Briones, Kuch, Liu, & Jin, 2011; Yeon, Choi, & Kiousis, 2007), media relations (Reber & Kim, 2006; Waters, Tindall, & Morton,

2010), stakeholder relationship management (Waters, Burnett, Lamm, & Lucas, 2009), and education (Roblyer, McDaniel, Webb, Herman, & Witty, 2010), etc. Closely matched with this study, the educational use of social media has recently been explored in many previous research studies (Ajjan & Hartshorne, 2008; Karl & Peluchette, 2011; Mason, 2006; Selwyn, 2007). However, these studies did not assess the potential of SNS engagement to improve TA environmental sustainability knowledge. Therefore, more investigations in the area need to be conducted. This study conducted a preliminary investigation of the issue.

Organization of the Paper

This thesis includes five chapters. Chapter 1 provides background of the study, statement of the problem, purpose of the study, justification of the study, and definition of terms.

Chapter 2 presents review of literature, theoretical framework, research questions, and hypotheses. Review of literature includes environmental sustainability and the TA industry, social media, social networking sites (SNS), and educational use of SNS. Theoretical framework includes the Theory of Reasoned Action (TRA) model and a discussion of TA perspectives of TRA model.

Chapter 3 provides research methodology including research design, setting and participants, instrumentation, procedure, data processing, and analysis. Setting and participants section provides a discussion regarding development of SNS Facebook page, sampling strategy, and sample recruitment procedures.

Chapter 4 reports findings in relation to research questions and hypotheses posed and

Chapter 5 brings a thorough discussion of the findings in relation to available studies investigating related issues. This chapter also included a presentation of key implications, limitations of the research, and recommendations for future studies. Finally, the chapter ends with concluding remarks.

Chapter 2 - Review of Literature

This study investigates the impact of SNS engagement on consumers' knowledge of environmental sustainability related to the TA industry by utilizing the SNS Facebook. This chapter provides a review of literature, theoretical framework, research questions, and hypotheses. Review of literature includes a discussion of environmental sustainability issues relevant to the TA industry, an overview of social media in general and social networking sites more specifically, and an examination of the educational use of SNS. The theoretical framework illustrates the Theory of Reasoned Action (TRA) model and TA perspectives of the TRA model.

Environmental Sustainability and TA Industry

The earth is a closed system of finite matters (Harding, 2006). From the beginning of the earth's formation some 4.5 billion years ago, no matter goes in or out except a tiny amount of spatial debris (Harding, 2006). This built-in limit of the earth is called carrying capacity of the earth (Pulliom & Haddad, 1994; Wackernagel & Rees, 1998). With this finite amount of resources, natural dynamics have been sustaining life on this earth through continuous transformations of matter from one form to another. These transformations occur in an equilibrium-based, yet dynamic process. In this process, nothing is exhausted or wasted. Rather, natural processes transform substances to facilitate subsequent processes.

The earth also has its own recharging capacity to recycle used portions of natural resources (coal, petroleum, etc.). Likewise, some of the life-sustaining natural processes such as the water cycle, carbon cycle, nutrient cycle, etc. need specific periods and proper conditions to recharge smoothly. Understandably, everything happening in nature abides by natural laws and is guided by balanced rules. If this balance is interrupted, nature behaves in unusual ways.

Environmental sustainability deals with maintaining balance in nature while performing necessary human activities. It refers to functioning within the natural balance and limits. Environmental sustainability can be better understood from Daly's (1990) proposal that "harvest rates should equal regeneration rates (sustainable yield)" and "the waste emission rates should equal the natural assimilative capacities of the ecosystem into which the wastes are emitted" (p.2).

However, current global economic activities are being carried out with little care for the impact to the environment. Over the last 50 years, the use of fossil fuels has quadrupled, water consumption has tripled, and the population growth has doubled (Robertson, 2014). Some scientists predict that the mineral reserve of the major non-renewable resources will be exhausted within the next 200 years if current practices continue (Plass, 2008; Saito, 2010). At least 60% of the global ecosystem services (e.g. water and mineral resources, etc.) has already been used unsustainably (Millennium Ecosystem Assessment, 2005). As mentioned earlier, the earth's ecosystem has a finite capacity to serve the human population. The number of people that a particular ecosystem can support, without degrading the ecosystem, is called the carrying capacity of that ecosystem. Unfortunately, Earth is now operating at 140% of its carrying capacity (Gilding, 2011) which means that Earth is supporting almost 1.4 times its capacity. This increased stress on the ecosystem has an alarming impact on the natural dynamics. If the current trend continues, 50% of the world's existing species is predicted to be gone by the year 2100 (Wilson, 2002).

The TA supply chain is one of the longest and most complicated industrial systems (Munn, 2011) involving raw material production, textile manufacturing, clothing construction, shipping, retail distribution, consumer use, and ultimate disposal of the garments (Sweeny,

2015). A wide variety of substrates, processes, machineries, components, and finishing steps are needed to make a finished apparel product (Hasanbeigi & Price, 2012). Most of these TA operations involve unsustainable usage of a substantial amount of water, energy, and chemicals.

Producing and processing of textile fibers requires using a high quantity of water. Every year, seven trillion liters or 1.84 trillion US gallons of water are consumed to meet the global textile demand (Siegle, 2011). Natural textile fibers, especially cotton fibers, require a substantial amount of water during cultivation. It might take up to 2,700 liters of water to produce the amount of cotton needed to make a t-shirt (WWF, 2013). Simply put, roughly 700 showers or 325 baths can be accomplished with the same amount of water required to make a t-shirt (South West Water, n.d.). The global per capita water footprint related to cotton consumption, defined as per capita water volume related to consumption of cotton products, is 43 cubic meters (Chapagain, Hoekstra, Savenije, & Gautam, 2006). The number is greater in the case of the USA where per capita water consumption due to consumption of cotton products is 135 cubic meters, more than three times the global average (Chapagain et al., 2006). This is overwhelming because only 1% of total global water is available for human use (WWF, n.d.). If this current trend of TA water consumption continues, it will only aggravate global water crisis in the future. However, producing and processing of synthetic fibers, such as polyester, nylon etc., require less water in comparison with natural fibers.

The TA industry is also one of the major consumers of the world's energy (Jananthan, Ameer, & Shiyamini, 2006). The industry mainly uses two types of energy: electricity and fuel-based, with electric energy being the dominant energy type. Energy consumption within the TA supply chain depends on the stage of production/consumption and geographic location (Hasanbeigi & Price, 2012). The spinning stage of textile production consumes the highest

amount of electric energy while man-made fiber production and the wet processing stage (e.g. dyeing) primarily consumes fuel-based energy (Palamutcu, 2015). The estimated current energy demand of the global TA industry is 13,000 Mtoe which is equivalent to 544 EJ per year (BP, 2014). Average energy consumption of 1 kg of textile fibers can be calculated as 126.05 MJ (Mega Joule) considering global fiber consumption of 82 million tons of fibers yields the rough estimation of 544 EJ global energy consumption for textile industry (Palamutcu, 2015). Differently pictured, in 2010 the industry consumed 132 million tons of coal to meet the global electricity demand of the TA industry (Siegle, 2011). The use of energy means the burning of non-renewable fossil fuels such as coal, gas, and oil. The burning of fossil fuels has two major mentionable consequences: depletion of natural reserves and carbon emissions. As discussed before, if current trends continue, the world's major mineral resources of energy will be gone within the next 200 years (Saito, 2010). Another alarming consequence of burning fossil fuels is that it will increase the carbon load of the world, contributing to global warming.

The textile industry also involves the intense use of chemicals both in fiber production and in other manufacturing processes (Munn, 2011). The industry utilizes more than 8,000 synthetic chemicals in various stages of the textile supply chain (Kant, 2012). Cotton utilizes 11% of all pesticides and 24% of all insecticides used globally, although it includes only 2.4% of arable land for cultivation (Sweeny, 2015). It is found that an estimated amount of 3.3 to 15.2 lbs. of chemicals is used to produce 1 kg (2.2 lb.) of fabric (Olsson, Posner, Roos, & Wilson, 2009) which is roughly equivalent to three pairs of jeans. The mind-boggling aspect of this fact is that producing fabric requires using a greater amount of chemicals than the fabric's own weight. In textile dyeing, fabric does not absorb all the dye particles used. Therefore, unused dyes drain out as effluent. Not only dyes, but also other auxiliary chemicals are used to

effectively process textiles. These unused dyes, along with residuals auxiliary chemicals drain out as effluent and end up in the water body treated, untreated, or partially-treated. As a whole, the industry produces nearly 52.8 billion gallons of colored effluent every year (Kant, 2012), vastly polluting the environment. The World Bank estimation indicates that 17-20% of global industrial water pollution comes from textile dyeing and finishing.

A variety of other environmental issues are present within the TA supply chain. For example, sixty percent of all TA production occurs in developing countries (Sweeny, 2015) where, compared to developed countries, environmental and social regulation is lax and resource depletion and environmental contamination is more likely. Additionally, 150 billion pieces of fashion products (Conca, 2015) that are made worldwide on an annual need to be distributed to the mainstream consumers in developed countries such as the US, the EU etc. (Abecassis-Moedas, 2006). This global distribution of TA products causes significant environmental impacts due to transportation (Borghesi & Vercelli, 2003). Finally, clothing care in the consumer use phase of textile products is another major contributor to environmental pollution. Laundering, drying, ironing, and other maintenance processes of clothing care is the largest energy consuming stage in the TA life cycle, accounting for nearly 39% of greenhouse gas emissions (Allwood et al., 2006; Cullen & Allwood, 2009; Yamaguchi et al., 2011). Therefore, a substantial responsibility goes into the hands of consumers. It would be very difficult to make the TA supply chain sustainable without making consumers aware of the impact of their clothing consumption practices on the environment.

Social Media

Social media is a web 2.0-based interactive platform by which people seek, interpret, share, exchange, discuss, co-create, and modify the content. Kaplan and Haenlein (2010) describe social media as, "…a group of internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content" (p. 61). Social media helps democratize knowledge and information and contributes to the transition of content consumers into content producers (Berthon, Pitt, Plangger, & Shapiro, 2012). Social media is easily accessible (easy to use) and scalable (fast reaching to masses) (Brogan, 2010; Zarrella, 2009). The content of social media comprises of text (e.g., blogs), images (e.g., Flickr), videos (e.g., YouTube), and networks (e.g. Facebook). This content is disseminated through interaction between users (Kietzmann, Hermkens, McCarthy, & Silvestre, 2011). Overall, social media performs the following functions: "(1) facilitate the rapid dissemination of information; (2) allows the accelerated spread and coalescence of interpretive frameworks that make sense of that information; and (3) allows the swift coordination of action – or, to be more precise, inter-action" (Berthon et al., 2012, p. 267).

Social Networking Sites

Of all social media, social networking sites are very trendy and the fastest-growing social media type. Not all social media is dependent upon the mutual connection of the users. For example, users can produce content in 'YouTube' for others to view without necessarily requiring personal connection. Such media is referred to as 'content communities'. Kaplan and Haenlein (2010) define SNS as, "…applications that enable users to connect by creating personal information profiles, inviting friends and colleagues to have access to those profiles, and sending

e-mails and instant messages between each other" (p. 63). Another definition of SNS could be, according to Ellison (2007):

> Web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system (p. 211).

SNSs are different than other social media in their abilities to leverage the power of relationships and collective wisdom of their users (Berthon et al., 2012). Brands are already using SNSs to create brand communities (Muniz & O'guinn, 2001). Discussion of fashion is a very popular topic on social media. For example, Zara and H&M were found to be two of the most discussed, blogged, and tweeted brands among fashion brands in Spain, France, and the UK (Berthon et al., 2012).

Facebook

The first rendition of Facebook appeared on October 2003 when Mark Zuckerberg, a 23-year-old student from Harvard, created Facemash.com. Facemash allowed Harvard students to compare two students' pictures side by side to let them decide who is 'hot' and 'who is not' (Zeevi, 2013). However, Zuckerberg officially initiated Facebook in 2004 (Hirschorn, 2007). At that time it was a Harvard-only SNS requiring an email ID with Harvard.edu (Cassidy, 2006) and "the general concept was to digitize the legendary freshman-year 'Facebook,' and allow students not only to gawk at one another's photos but also to flirt, network, interact" (Hirschorn, 2007, para. 4). Beginning in September 2005, Facebook started to include high school students and professionals inside corporate networks. Finally, "the site moved beyond college to high-school networks, then company networks, then everyone" (Hirschorn, 2007, para. 4). Today, 1 out of

every 5 people on the planet has an active account on Facebook and 890 million people use Facebook daily (Halleck, 2015).

Educational Use of SNS

Online social networking sites provide a conducive virtual space to network and socialize. They allow users to share information and express thoughts along with showcasing and expanding their personalities. Like-minded people can create clusters where they can easily access relevant information from both structured sources and user-generated unstructured content. User-generated unstructured content refers to the content generated by interactions among users in a SNS space, for example, a Facebook page (https://www.facebook.com/pages). From an educational perspective, this ease of access to a multitude of SNS content can be viewed as a knowledge acquisition possibility. Boon and Sinclair (2009) mention, "…the connectivity of Facebook mixed with its ability for integrated multimedia, polling, and asynchronous chat could be put to use in an academic setting" (p. 108). Like Facebook, Twitter groups convey information to users, Pinterest boards bring inspiration to creative professionals, and LinkedIn groups present relevant information to job seekers and so on. Therefore, all SNS have potential to be used in an educational setting. A network of a good number of people brings collective power to collaborate, share, learn, and promote things. In an SNS setting, users typically acquire knowledge subconsciously through sharing info, interacting with others, commenting on social issues, etc. (Selwyn, 2007). Benkler (2006) argued that online participation makes people more critical, self-reflective, and collectively intelligent through opinion sharing.

Although studies are limited, a few previous research studies investigated the potential of SNSs as educational tools (Ajjan & Hartshorne, 2008; Karl & Peluchette, 2011; Mason, 2006; Selwyn, 2007). They acknowledged that SNSs can be utilized as educational tools. For example,

Greenhow (2009) maintained that SNSs can be "social learning resources and spaces for new literacy practices" (p. 11). Similarly, Aydin (2012) suggested that "Facebook can be used as educational environment, as it improves classroom practices and student involvement" (p. 1101). Likewise, Lee and McLoughlin (2008) recognized SNSs as pedagogical tools because they provide spaces for connectivity, social support, collaborative info discovery, information recovery, and so on. In one experiment, Robelia, Greenhow and Burton (2011) used a Facebook application called Hot Dish allowing its users to post climate change-related stories from other websites and to comment on those stories to see how this practice improved environmental knowledge and behavior of students. They found that users of the application had above-average knowledge of climate change science and their pro-environmental behavior increased during interaction with the application.

To investigate if SNSs can serve as educational tools in an informal learning context, Pimmer, Linxen, and Gröhbiel (2012) conducted a focus group interview of medical students and professionals. The students in their study indicated that they frequently use various Facebook groups and pages for learning purposes. Cain and Policastri (2011) utilized a Facebook group to expand the course content of a pharmacy-related course with a view to facilitate informal learning. They incorporated outside experts' perspectives in that Facebook group in relation to the content covered in the course. Among the participants, 77% indicated that the activity was valuable to some degree. In addition, an independent t-test conducted by them revealed a significant exam score difference between Facebook group participants and nonparticipants in that study.

In another study, Kennelly (2009) provided an exercise on MySpace (another type of SNS) to an introductory Earth Science class in order to reinforce learning about rocks and

minerals. Students participating in that MySpace exercise indicated that the exercise was enjoyable and helpful. They also indicated that the exercise helped them to learn and remember the topics. Similar indication was also found in other studies as well (e.g., Jaffar, 2014; Pollara & Zhu, 2011). In another study of whether content sharing on Facebook page increases ocean literacy of users, Fauville, Dupont, von Thun, and Lundin (2015) identified that shared content, by "supporting situational interest", can motivate users to learn more about that domain (p.72).

Upon reviewing of above literature, this researcher sums up the following abilities of SNSs regarding information generation and knowledge sharing: 1) that SNSs enable networking and collaboration with people; 2) SNSs help create user-generated knowledge through mutual interactions; 3) SNSs converge multifaceted online and offline news sources; 4) SNSs expedite easy diffusion of knowledge among users; and 5) SNSs facilitate subliminal and informal learning. In conclusion, it can be said that SNSs have the potential to be used as educational tool as they seem to increase users' knowledge of an issue. Nevertheless, more studies need to be conducted to investigate how this potential can be augmented, better utilized, and efficiently integrated into educational contexts.

Engagement Related to SNS Posts

Leung (2012) studied the marketing effectiveness of hotel Facebook pages. In his study, he identified two classifications of messages posted on hotel Facebook pages: message content and message format. For messaging content, the Leung (2012) study found involvement messages (such as interacting with fans, asking questions, asking for comment, experience sharing, etc.) to be an effective tool. Similar findings were also reported by Nguyen (2011) and Thomsett-Scott (2013). As per messaging format, the Leung (2012) found that 'picture messages' were better in generating positive attitudes with customers whereas 'word' and

'weblink' messages were better for inducing intentions. Uploading videos can also help engage consumers (Levy, 2010). Thomsett-Scott (2013) stressed thinking of the end benefit the users would get out of each post. He also reported "videos, infographics, links, polls, pictures, and other forms of media provide diversity and are more interesting and engaging than text alone" (p. 34). A survey conducted by Usurv (which is a survey research tool, link: https://www.usurv.com/) found that UK people were more likely to share, comment, and like an online video more than they were to like a text post (Steers, 2013). Facebook posts get 2.3 times more engagement with images than those with texts (Mawhinney, 2017). Other studies also reported similar results. For example, information posted in video and photo formats generated the most engagement in the case of a tobacco control program's smoking cessation promotion (Duke, Hansen, Kim, Curry, & Allen, 2014). Similarly, a story posted with a photo or video lead to a higher number of post clicks than a story posted only with text (e.g., Fauville et. al. 2015).

Regarding posting frequency, regular posting was found to be effective for Facebook pages to remain on fans' newsfeed, whereas too many posts can distract followers (Thomsett-Scott, 2013). Likewise, several posts per week was reported to be good while daily posting was recommended (Thomsett-Scott, 2013). Information posted on weekends and later in the day was found to be generating better click-through rates (Zarrella, 2012).

Conceptual Framework

The Theory of Reasoned Action (TRA) provides some insight regarding how consumers may be encouraged to change apparel purchase behaviors to become more sustainable. TRA was developed by Azjen and Fishbein in 1975 to predict the behavior of consumers. According to the theory, a person's belief about an issue influences his/her attitude towards the issue, which contributes to the formation of a strong intention to behave, leading a person to behave in a certain way (Ajzen & Fishbein, 1975). The strength of the behavioral intention is the key indicator of the actual behavior of a person. Therefore, to predict the behavior of a person, knowing behavioral intention is necessary.

A person's belief toward an issue represents the information the person has about the issue (Ajzen & Fishbein, 1975). People may hold both positive and negative beliefs about an object or issue. They form several beliefs on an object or issue based on direct observation, learning, inferences, or information received from outside sources. Using the information, they associate multiple attributes with the object or issue based on the information they have. The totality of the belief they have serves as the informational base determining their ultimate attitudes, intentions, and behaviors (Ajzen & Fishbein, 1975).

Attitude corresponds to the total affect associated with the beliefs of a person. According to the theory, "a person's attitude toward an object is based on his salient beliefs about that object" (Ajzen & Fishbein, 1975, p.14). Therefore, the attitude of a person towards an issue is determined by the belief of the person that the issue has certain attributes and his evaluation of those attributes (Ajzen & Fishbein, 1975). The theory also posits that attitudes are concerned with predisposition to behave rather than behavior itself and affect is the most essential part of

attitude (Ajzen & Fishbein, 1975). Attitude is one of the major determinants of a person's intention to perform a behavior (Ajzen & Fishbein, 1975).

Behavioral intention refers to a person's intention to perform a certain behavior and is the immediate determinant of the corresponding behavior. Intention is usually a function of certain beliefs. More specifically, it is the function of two factors: attitude toward the behavior and subjective norm (Ajzen & Fishbein, 1975). The strength of the intention signifies the subjective probability that the person will perform the behavior in question (Ajzen & Fishbein, 1975).

Subjective norm is the totality of the normative pressure. A person may be motivated to behave in a certain way by the preferences of others. He/she may consider what others would think if he/she behaves a certain way or what others want him/her to do. The belief of these preferences of others is called as normative belief. A person may or may not be motivated to comply with any given referent. Combined, 'normative belief' and 'motivation to comply' create a normative pressure, forming the 'subjective norm' of a person (Ajzen & Fishbein, 1975). Previous studies have supported that social influence processes (Fulk, 1993; Schmitz & Fulk, 1991) can have important influences on attitudes, establishing subjective norm as an important antecedent of behavioral intention (Mathieson, 1991; Taylor & Todd, 1995; Thompson, Higgins, & Howell, 1991).

Ajzen and Fishbein (1980) also indicated that external variables such as demographics, traditional attitudes toward targets, personality traits and so on might be included in the model to have a better understanding of the behavior in question. Other researchers also suggested to include external variables such as experience, media influence, past behavior, or involvement, to predict behavior (Bagozzi, Wong, Abe, & Bergami, 2014; Bunce & Birdi, 1998; Shim, Morris, & Morgan, 1989). For example, Nabi and Sullivan (2001) included 'television viewing' as an

external variable in the TRA model and found positive relationship with belief formation about prevalence of crime and violence in society.

It can clearly be seen from the above discussion of the TRA model, that attitudes (which are antecedent variables of intention and behavior in the model) are measured by assessing beliefs. Three different processes can form this belief: direct observation (called as descriptive belief), extrapolation (inferential belief), and through outside information (informational belief). For example, a person may observe that a dining table is round. This direct experience forms a descriptive belief about the table. This hypothetical person, if frequently observe several round dining tables, might form an inferential belief that all dining tables are round. On the other hand, outside sources, such as newspapers, books, television, radio, social media, friends, relatives, and so on provide information about objects, leading to a shift in the individual's belief formation, representing "informational belief" (Ajzen & Fishbein, 1975, p. 132-133). In other words, exposure to new information affects individual's cognitive dimension, which, under favorable circumstances, influence belief. This belief shaped by cognitive processing, in turn, influence attitude, intention, and ultimately behavior (Engel & Blackwell, 1982).

When discussing behavior, Ajzen and Fishbein (1975) mentioned, "…attempts to bring about change invariably involve exposure to new information about some object, behavior, issue, or event" (p. 387). Access to new information about an object or issue essentially changes the knowledge about that object or issue. Earlier researchers held the notion that this change in knowledge, in turn, would shape the belief, which influences the subsequent attitude formation (Engel & Roger, 1982; Shrum, 1995). As for example, Nabi and Sullivan (2001) reported to found positive relationship with belief formation about prevalence of crime and violence in society when included 'television viewing' as an external variable in the TRA model.

After reviewing the TRA model and above literature about SNS usefulness as an educational tool, the potential need for research focused on whether TA environmental sustainability knowledge might be enhanced through SNS interaction, which may subsequently influence environmentally conscious attitudes and behavior of the TA consumers became evident. However, the researcher realized it would be important to first understand whether consumers' informational beliefs can be impacted by sharing information and encouraging interaction on SNS. Since Ajzen and Fishbein (1980) indicated influence of external variables towards behavior in their model, the current research investigated influence of SNS engagement (as an external variable in the model) on knowledge increase (Figure 2.1). The study took an initial step to investigate whether engagement in a SNS platform increased users' knowledge related to TA environmental sustainability or not.

The following section reviews TA-related literature relevant to the variables of the TRA model, within the context of the study. The discussion follows a common pattern: introducing a TRA variable, connecting the variable with environment, and then relating the variable to TA aspects.

Belief, Environmental Knowledge, and Environmental Apparel Knowledge

The TRA model suggests that a person's attitude towards a behavior is influenced by two variables: belief about the outcome and the evaluation of the outcome. The belief is again shaped by several other external factors such as demographics, educational background, personality traits, knowledge of the issue, etc. (Ajzen & Fishbein, 1975). Actually, a person's belief about something is the knowledge of the issue, and how a person has become knowledgeable whether

by family, tradition, education, interaction, society and so on. People's knowledge is a very important variable that helps form beliefs and attitudes (Engel & Roger, 1982).

Environmental knowledge is defined as "information that individuals have about the environment, the ecology of the planet, and the influence of human actions on the environment/ecology" (Arcury & Johnson, 1987, p. 32). Fryxell and Lo (2003) defined environmental knowledge as "general knowledge of facts, concepts and relationships concerning the natural environment and its major ecosystem" (p. 48). Some previous research reports no relationship between environmental knowledge and environmental behavior (Amelang, Tepe, Vagt, & Wendt, 1977; Maloney & Ward, 1973; Maloney, Ward, & Braucht, 1975; Schahn & Holzer, 1990) or some moderate relation (Oskamp et al., 1991; Smythe & Brook, 1980; Stutzman & Green, 1982). However, other researcher reports that knowledge of an environmental issue can significantly predict environmentally-friendly behavior (Kaiser & Fuhrer, 2003; Levine & Strube, 2012; Polonsky, Vocino, Grau, Garma, & Ferdous, 2012). The inconsistent relationships found between environmental knowledge and environmental behavior might be due to other mediated variables such as 'environmental belief', 'environmental attitude', and 'purchase intention of environmental products'. For example, Arcury (1990) as well as Makki, Abd-El-Khalick, and BouJaoude (2003) found that environmental knowledge was significantly and positively related to environmental attitude. In addition, consumers' environmental knowledge has been found to be positively related with their intention to purchase environmentally sustainable products (Kaiser, Ranney, Hartig, & Bowler, 1999). However, researchers do seem to agree with the notion that individuals supplied with the necessary knowledge of an environmental problem would demonstrate responsible behavior in their consumption (Barber, Taylor, & Strick, 2009; Duerden & Witt, 2010; Henion, 1972; Hines,

Hungerford, & Tomera, 1987; Hsu, 2004; Schlegelmilch, Bohlen, & Diamantopoulos, 1996; Thøgersen, 2000). Consumers' belief that they can solve environmental problems was said to be the most logical predictor of environmentally conscious behavior (Roberts, 1996). Therefore, it is essential for consumers to have awareness (knowledge) of TA sustainability issues as a precursor to believing that they can play a role in solving environmental problems through their behavior.

From the TA perspective, Stephens (1985) reported that "public awareness of the connection between clothing consumption and environmental issues is far from universal and decidedly less prevalent than awareness of the ecological impact of other consumer products" (p. 198). In her study, 20.7% of the sample (out of 377 participants) did not perceive a relationship between clothing consumption and the environmental issue. However, she found that consumers with more knowledge of apparel environmental issues are more likely to engage in environmentally responsible apparel purchasing behavior such as purchasing clothing from second hand stores. Lin (2009) found a connection between owning organic cotton products and higher eco-literacy. Conversely, Hiller Connell and Kozar (2012) reported that TA-related environmental knowledge did not translate into sustainable apparel purchasing behavior. Likewise, Brosdahl and Carpenter (2010) found that knowledge of the environmental impact of textile and apparel production did not positively influence environmentally friendly consumption behavior. This anomaly in TA-related literature might be due to the fact discussed above that there are several other intervening variables between TA-related environmental knowledge and sustainable apparel purchase intentions such as environmental attitude or belief that an individual can solve sustainability problems or at least have a role to play.

Attitude, Environmental Attitude, and Attitude towards ESA

Attitude is one of the major variables of TRA model. It is defined as "a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object" (Ajzen & Fishbein, 1975, p.6). There are three basic features of attitude: it is learned, it predisposes action, and such actions are consistently favorable and unfavorable toward the object (Ajzen & Fishbein, 1975). Attitude towards any behavior affects intention of doing the behavior which ultimately influences one to display actual behavior.

Environmental knowledge is thought to be a precondition of forming environmental attitude (Flamm, 2009; Mosinder, 1998; Kaiser et al., 1999; Stutzman & Green, 1982) although some studies report moderate or weak relationships between the variables (Gambro & Switzky, 1994; Grob, 1995; Kuhlemeier, Van Den Bergh, & Lagerweij, 1999; Stutzman & Green, 1982). Conversely, other studies report the relationship to be strong (Arcury, 1990; Polonsky et al., 2012). As theorized by Ajzen and Fishbein (1975), environmental attitude has been found to influence environmental behavior intention (Barber et al., 2009; Howell, 2011; Levine & Strube, 2012). However, like environmental knowledge, environmental attitude has also been found as a scarce predictor of subsequent environmental behavior (Costarelli & Colloca, 2004).

In the TA context, research indicates that younger consumers show more favorable attitudes towards environmentally responsible clothing consumption (Butler & Francis, 1997). Kang et al. (2013) found that consumers' product knowledge significantly affects young consumers' attitudes. Wang (2006) reported a positive relationship between consumers' attitudes towards apparel shopping and consumer apparel purchase intention in the case of Taiwan consumers. Hustvedt and Dickson (2009) found that consumers using organic cotton content to form their apparel purchase intention had positive attitudes towards organic and sustainable

agriculture and showed concern for the environmental impact of clothing production. Belleau, Summers, Xu, and Pinel (2007) examined Generation Y (also called Millennials) consumers' purchase intention of merchandise made from 'emu leather' and found that their attitudes toward the behavior (e.g., buying emu leather product) had the most impact on purchase intention. They reported that "the Generation Y group is technologically savvy; therefore, to sell the product of interest to this group, creating and increasing a positive attitude via internet and other technological innovations may provide an increase in sales" (p. 254). The same note might also hold true for motivating consumers to purchase ESA products. To motivate Generation Y consumers (18-35 age group in 2014) to purchase ESA, creating and increasing positive attitudes towards purchasing ESA via the Internet, social media, and web-based technology might be a potential tool.

Subjective Norm and SNSs as Subjective Norm

According to Ajzen and Fishbein (1975), normative beliefs ("beliefs that certain referents think the person should or should not perform the behavior in question") and motivation to comply (to be willing "to comply with any given referent") lead to normative pressure; the totality of this normative pressure is called subjective norm (p. 16). Subjective norm is a major determinant of a person's intention to perform a behavior. Previous research validates subjective norm as a significant antecedent of behavioral intention (Mathieson, 1991; Robertson, Zielinski, & Ward, 1984; Taylor & Todd, 1995; Thompson et al., 1991; Wang, 2006). In the case of environmentally conscious consumption, subjective norm was also reported to be important determinant of behavioral intention (Khare, 2015; Kumar, 2012; Moser, 2015; Tsarenko, Ferraro, Sands, & McLeod, 2013).

Word of Mouth (WOM) – the interpersonal communication regarding products and services among users (consumers) – is a very influential source of information for consumers (Alreck & Settle, 1995; Arndt, 1967). Electronic word of mouth (eWOM) travels the virtual world of consumers to make particular news viral in no time. For example, two-thirds of the 21,258 respondents in the study by Socialmedialink said they were most likely to share via Facebook opinions about product purchases (Ben, 2015). A survey by Netbase (2013) found that US consumers aged over 18 years agreed strongly with the statement that "the brands and products my friends use influence my own purchase decision" (Fashionunited, 2013). Furthermore, in the study by Socialmedialink, 67% of the respondents said they seek info from family and friends to gather info before any product purchase (Ben, 2015).

In a TA-related study, Kang et al. (2013) found that consumers' product knowledge significantly influences young consumers' subjective norms, which along with other variables, affect purchase intention of environmentally sustainable apparel and textiles. Wang (2006) reported the positive effect of subjective norm on US consumers' apparel purchase intentions. In the study, US consumers mentioned the top three referents as 'friends' (60%), 'parents' (22%) and 'girlfriend/boyfriend' (18%). Cowan and Kinley (2014) also validated the fact that US consumers' intentions towards purchasing ESA was influenced by social pressure. de Araújo, Cristiano Mineiro Branco and Loureiro (2014) reported that subjective norm significantly impacted Brazilian consumers' willingness to pay more for luxury brands. However, in a study of the purchase intention of merchandise made of 'emu leather', Belleau, Summers, Xu, and Pinel (2007) found that Generation Y did not feel social pressure to comply with peers or referents. The result is a bit surprising to the theory and what literature suggests. One of the possible causes could be, as Belleau et al. (2007) stated, "…the product of interest is relatively

new to the market, is not a well-known fashion item, and has received little or no promotion to consumers" (p. 254).

Behavioral Intention and Purchase Intention of ESA

Behavioral intention is the only variable of the TRA model that directly affects actual behavior. It refers to the willingness to display the behavior, not the behavior itself. The reason for this is that there may be many other factors that might prevent people from doing an actual behavior. For example, a person may be very willing to buy an environmentally sustainable product, but he/she cannot afford the product, or he/she does not have adequate knowledge to identify a sustainable product, and so on.

Environmental behavior intention has been found to be strongly related to environmental behavior across studies (Lansana, 1992; Makki, Abd-El-Khalick, & BouJaoude, 2003; Maloney & Ward, 1973; Maloney et al., 1975; Schahn & Holzer, 1990). Studies also reported environmental knowledge as a significant precondition of the environmental behavior intention (Mosinder, 1998; Manrai, Manrai, & Ryans Jr., 1997).

Intention to purchase environmentally sustainable apparel (ESA) can be defined as the willingness to buy ESA. ESA can be defined as apparel products manufactured, distributed, and consumed in a way which does not deplete or destroy natural resource (air, water etc.) permanently (Walter, 2009). Willingness to demonstrate a behavior does not necessarily reflect the behavior itself because the many variables affecting purchasing behavior as discussed before, may exist. In the TA-related research, Kang et al. (2013) found a significant positive relation between consumers' product knowledge, perceived consumer effectiveness, and perceived personal relevance with young consumers' attitudes, subjective norm, and perceived behavioral control, with these ultimately effecting the purchase intention of environmental sustainable

textile and apparel products. Cowan and Kinley (2014) mentioned that knowledge of ESA moderately influences the purchase intention of ESA of US consumers. On the other hand, the study conducted by Ha-Brookshire and Norum (2011) showed that the consumers with stronger attitudes towards the environment were not willing to pay a premium for organic and sustainable cotton. The possible reason is that "perhaps, consumer may think that if they are truly concerned about the environment, less or non-consumption of apparel would help protect environment more effectively…" (Ha-Brookshire & Norum, 2011, p. 349-350).

After reviewing the above literature, a conceptual research model was developed by incorporating external variables in the TRA model which is presented in Figure 2.1. The horizontal dots indicate the scope of investigation conducted in this study. Which represents that the investigation was limited to the external variable portion of the TRA model with a view to understand whether 'SNS engagement' enhanced participants' 'TA-related environmental knowledge'. Participants' SNS engagement was thought to be having two forms: engaging in TA sustainability related postings and interaction among participants. This study did not investigate the association of TA environmental knowledge with other variables of the model. It just took an initial step to investigate whether SNS engagement with TA-related environmental information improved the participants' knowledge of these issues. Along the investigation, The TRA model guided the researcher in logical thinking.

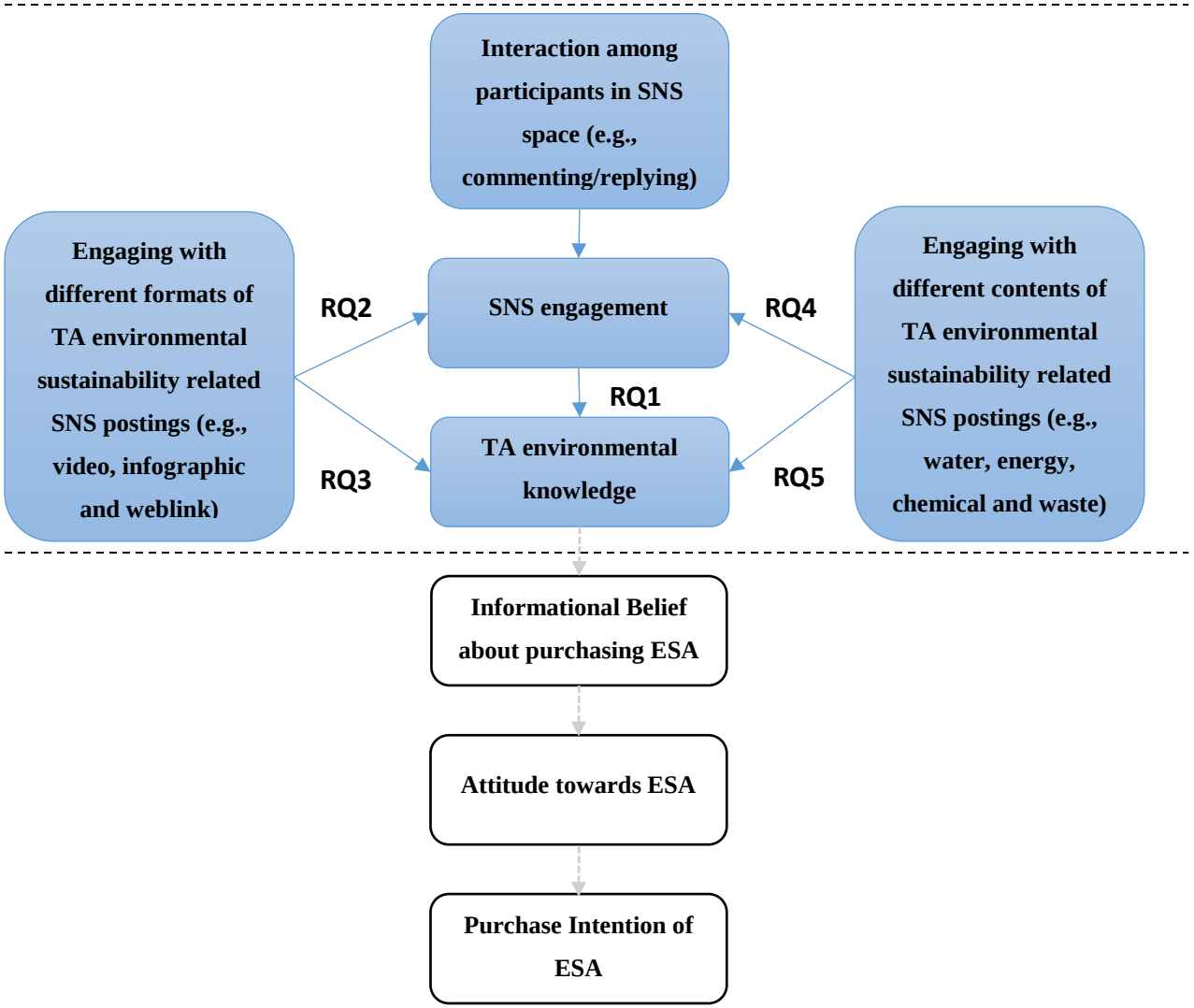

Figure 2.1 Conceptual Research Model (adpated from Ajzen and Fishbein, 1980)

Research Questions and Hypotheses

The review of the above literature provided key background information. First, consumer awareness (i.e., knowledge) of the TA environmental issues was very important as it might shape actions and behaviors towards sustainable TA consumption. Second, SNSs have the potential to be used as consumer awareness building tools because they have been reported as educational tools. Based on this reasoning, the following research questions and hypotheses were maintained in the study:

RQ 1: Does engagement with TA-related environmental information shared on Facebook improve consumers' knowledge of TA-related environmental sustainability?

H 1: There will be a significant improvement in knowledge scores after engaging with posted information related to TA environmental sustainability.

RQ 2: Which format (i.e., video, infographic, and web link) of TA-related environmental posts shared on Facebook leads to a higher level of engagement?

H 2a: The video format of TA-related environmental posts shared on Facebook will lead to a higher level of engagement than the web link format.

H 2b: The infographic format of TA related environmental posts shared on Facebook will lead to a higher level of engagement than the web link format.

RQ 3: Which format (i.e., video, infographic, and web link) of TA-related environmental posts shared on Facebook have a greater influence on knowledge change?

H 3a: The video format of TA-related environmental posts shared on Facebook will have greater influence on knowledge change than the web link format

H 3b: The infographic format of TA-related environmental posts shared on Facebook will have greater influence on knowledge change than the web link format.

RQ 4: Which content (i.e. water, energy, chemicals, and waste) of TA-related environmental posts shared on Facebook results in a higher level of engagement?

RQ 5: Which content (i.e. water, energy, chemicals, and waste) of TA-related environmental posts shared on Facebook has a greater influence on knowledge change?

Chapter 3 - Research Methodology

This study investigated the impact of SNS engagement on consumers' knowledge of environmental sustainability related to the TA industry. In addition, the study investigated whether certain formats for posting TA sustainability information on a Facebook page encouraged greater participant engagement in the page activity and stimulated greater knowledge change than other formats. Similarly, the study also investigated what TA sustainability content generated more engagement in Facebook page activity and led to greater knowledge change. This chapter provides a discussion of the research design, setting and participants, instrumentation, data collection, and data processing and analysis.

Research Design

A mixed method research approach was employed to meet the purpose of the study. The quantitative data helped the researcher understand the authenticity of knowledge change. And the qualitative data coming from open-ended questions as part of the survey enriched that understanding. Simple one group, pretest-posttest experimental design (Campbell & Stanley, 1971) was employed in this study. Although a one group, pretest-posttest experimental design falls short of eliminating usual threats, reducing internal and external validity (Campbell & Stanley, 1971), the design served the exploratory purpose of the research. In other words, as this study was a preliminary investigation of the issue, the research design served the purpose of the study (Knapp, 2016). The one group, pretest-posttest experimental design looked like the following:

T_1		T_2
O_1	X	O_2

Where,

O_1 = Pretest observation in T_1

O_2 = Posttest observation in T_2

X = Treatment

To investigate which format of TA sustainability information posting on the Facebook page engaged the participants more and led to greater knowledge change, quantitative analysis of the data was carried out. Similar quantitative analysis was also carried out to understand what type of TA sustainability content helped participants to engage more in the Facebook page activity and which led to greater knowledge change. More elaboration of the analyses is discussed in later sections.

Setting and Participants

The study employed a Facebook page as a representative platform of SNSs because globally Facebook holds the top social media position, capturing an 39.14% market share as of November, 2017 (Kallas, 2017) with about 3.20 billion active social media users (Chaffey, 2018). Active accounts are defined as people who use the social network as least once a month (Statista, 2016a**).** Seventy two percent of US Internet users use Facebook (Statista, 2016b**)**. In 2014, US users spent an average of 39 minutes on Facebook every day (Statista, 2016c**)**. Research by Socialmedialink (2015) reported that 54% of the respondents said Facebook was the most common place to know about any new product (Ben, 2015). Another study by Urban Land Institute (2013) revealed that half of the women and 44% of the men used Facebook or Twitter to get the notifications of upcoming sales (eMarketer, 2013). Lastly, Facebook provided a unique opportunity to create a page to share information among followers.

US Millennials, those born between 1982-2004, as defined by Howe and Strauss (2009) were selected for the study because this generation has a tremendous impact on spending power of more than $200 billion annually starting in 2017 and $10 trillion in their lifetime (Nelson, 2012). About half of the females of millennial age shop more than twice a month (Honigman, 2013). The millennial group was found to be aware of many global issues (Jayson, 2006; Williams & Page, 2011) such as environmental and social ills of companies (Bhaduri & Ha-Brookshire, 2011; Jayson, 2006). Almost 50% of millennial-aged parents reported that they try to buy products supporting causes or charities (Honigman, 2013). Therefore, this age group was appropriate for the study considering their awareness of global issues and participation in social media. They represent 48.31% of total Facebook users in the US, equaling 86 million users (Nayak, 2014). Seventy one percent of this age group uses Facebook everyday (Mintel, 2015). Additionally, this generation frequently utilizes social media to evaluate and justify their purchases. According to reports both by Bazaarvoice (www.bazaarvoice.com/) and Kelton Research (https://www.keltonglobal.com/), some 84% of Millennials said that social media opinions influenced their purchasing decisions (Nelson, 2012). Thirty five percent of millennial-aged women said that social media was a top influencer of their clothing purchases (Mintel, 2015).

Facebook Page

A Facebook page (Figure 3.1) is a feature of Facebook allowing individuals, organizations, brands, artists, non-profits, and businesses to promote themselves. It is featured to share information among the users on Facebook and to make connections among them (Kuhikar, 2013). Anybody having a Facebook account can open a Facebook page. A page helps brands to promote their products to the consumers, artists to increase fan bases, and non-profits to promote

causes, etc. This study aimed to disseminate TA environmental sustainability information to the participants and investigate their knowledge change. Therefore, the Facebook page was anticipated to be a good channel to spread information with the participants. People who like a certain page are called “followers”. There is no limitation on the number of pages that one can create on Facebook and the number of followers any page might have. The primary success of a page depends on the total number of followers “liking” or following the page. There are several other metrics too for determining success of a page, such as total reach, engagement, sentiment, etc.

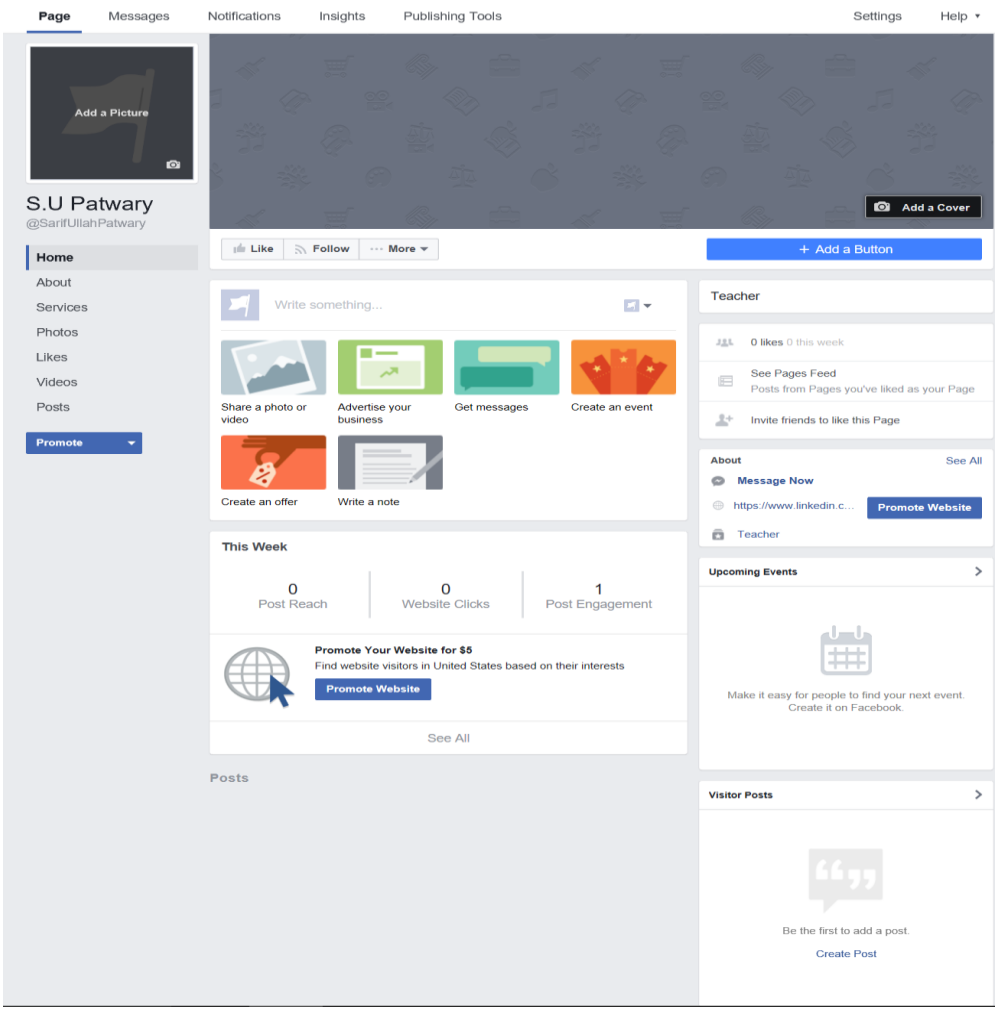

Figure 3.1 Facebook Page (https://www.facebook.com/business/products/pages)

Pages are public to everybody, but the page admin (owner of the page) can maintain page audience. The admin can also customize the age group and location of the target audience. A 'Publishing Tools' option is available for the admins to create, draft, and publish posts using many interactive tools. Any post can also be scheduled to be posted at a given time frame.

Sampling Strategy and Recruitment

The study included US individuals aged 18-35 (Millennial cohort). A convenience sampling strategy was used to identify target samples. The study required participants to be members of an experimental Facebook page as part of the treatment. Therefore, sample size was determined carefully so that the participants' interaction could be monitored efficiently on the Facebook page. Because very large sample size becomes difficult to manage in an experimental design, usually, a sample size of 30-40 is sufficient for an experimental study (Scheidt, R. J., personal communication, Feb 10, 2017). However, multiple regression analysis planned for data analysis required a greater number of samples than what was required for an experimental design. Past studies discussed pros and cons of using different sample sizes for multiple regression analysis with a focus on effect size and power (Green, 1991; Harris, 1985; Cohen, Cohen, West & Aiken, 2013). For example, Harris (1985) suggested the number of participants to exceed the number of predictors by at least 50. Green (1991) suggested the number of participants to be more than 104 plus predictor. VanVoorhish and Morgan (2007) suggested "…no less than 50 participants for a correlation or regression with the number increasing with larger numbers of independent variables" (p.48). After reviewing the above literature, with the experimental design and regression analysis in mind, a sample of 50-60 participants was initially expected for the study. The final sample included 51 participants.

The researcher reached out to potential participants using personal contacts, a survey panel (provided by K-State Survey), and K-State Today Student Edition (Appendix C). Since college students were thought to be a good source of a millennial cohort, the survey panel and K-State Today Student Edition were used to reach out to them. In addition, personal contact was made to recruit individuals to the study. More discussions on finalizing research participants for the study is discussed in the data collection section.

Instrumentation

This study investigated the impact of SNS engagement on consumers' knowledge of TA-related environmental sustainability. A study-specific 'Textile and Apparel Environmental Sustainability Knowledge (TAESK) scale was employed in this study. This section discusses various aspects of instruments including scale development, scale refinement, and final survey development.

Scale Development

The Textile and Apparel Environmental Sustainability Knowledge (TAESK) scale was developed to specifically test research participants' knowledge of TA environmental sustainability information. The researcher first divided TA environmental sustainability information into four basic categories: water, energy, chemical, and waste (see Facebook page content development section). Then, typical environmental impacts resulting from TA production and consumption in each category were identified as the important information a consumer needs to know in order to make more informed purchase decisions.

With that being decided, existing scales designed to measure TA environmental knowledge were examined. For instance, Kim and Damhorst (1998) used an 11-item scale to

measure participants' environmental apparel knowledge. They included items related to "…processing of fibers, recyclability of fibers, contribution of textile products to waste disposal, by-products from cleaning agents, and regulatory policies" (p. 128). However, a few items (e.g., item 3 & 7) were deemed to be unsuitable considering the Facebook page content which the research participants would be interacting with. In addition, the scale, as a whole, is pretty much outdated as our knowledge of TA environmental issues developed and refined with this long span of 20 years. Kang, Liu and Kim (2013) developed six items based on a theoretical framework of Philippe and Ngobo (1999) to measure consumer knowledge of organic cotton apparel. The items, too, were not pertinent because the intervention in this study did not include organic cotton issues. Hiller Connell and LeHew's (2017) Environmentally Sustainable Apparel Knowledge (ESAK) scale includes 24 items to measure consumer knowledge of ESA. The items of the ESAK scale were deemed too technically detailed to understand by the general consumers. In addition, very few items were relevant to the intended purpose of this study. Although mainly original for this study, a few items of TAESK scale (e.g., item 1 and 8) were inspired by the ESAK scale.

Measuring knowledge of an issue is a difficult task. Because our knowledge of a particular issue changes with time and new understanding replaces the old one. As there was no convincing textile and apparel sustainability knowledge scale, the researcher developed TAESK scale that served the purpose of the study. After reviewing above scales and considering the Facebook page content to be delivered, 12 items were developed for the TAESK scale with three items for each category (e.g., water, energy, chemical, and waste). Since the researcher divided TA sustainability into four categories, including 3 items in each category made a total of 12 items for the scale which was thought to be reasonable (i.e., not too short, not too lengthy). The

items were written in 8th grade language so that non-technical people easily understand the idea being conveyed within each item. They were true/false statement confirmed by current literature. The items were first arranged in order of category and then randomized to increase internal relevance of the scale. The response options were basic 'true/false' choices with the addition of a 'do not know' option. Participants received a plus one point for each right answer, a minus one point for each wrong answer and a zero for 'do not know' answers. Thus, each participant had the possibility to get maximum 12 points and a minimum -12 points.

Scale Refinement

Once the initial scale was developed, it was further refined in two stages:

1. Review by subject matter expert
2. Feedback from representatives of target population

The research supervisor and two committee members served as subject matter experts. They commented on the relevancy of items in relation to the information to be posted, inclusion and exclusion of items in relation to the end goal of the study, modification and authenticity of the items, etc. On the other hand, the target population representatives responded on three categories of the items: clearly written, easy to understand, and any other feedback. The target population representatives included six US millennial individuals.

The refinement process began with modification of items based upon expert feedback. For instance, an item initially written as, "petrochemical-based nylon and polyester are environmentally friendly because they contribute substantially less greenhouse gas emissions than other fibers" was modified as, "petrochemical-based nylon and polyester are environmentally friendly because they contribute substantially less greenhouse gas emissions than other fibers during production" following an expert review. Afterwards, the researcher

arranged individual Skype interviews with the target population representatives. They read aloud every single item of the scale and gave feedback in the above three aspects. The researcher compiled their feedback and used the majority opinions to refine the items in the final scale. For example, the first item of the scale was initially written as, "During laundering process, synthetic fabrics shed microfibers which eventually make their way into water bodies and harm aquatic life". Following the feedback from a majority of the representatives, the item was changed to "During the laundering process, synthetic fabrics shed microfibers which eventually make their way into water bodies and harm aquatic life". Another item originally written as, "Petrochemical-based nylon and polyester are environmentally friendly because they contribute substantially less greenhouse gas emissions than other fibers during production" was refined to "Nylon and polyester are environmentally friendly because they contribute substantially less greenhouse gas emissions than other fibers during production". Likewise, all the other items were refined following the above-mentioned two-step refinement process. The Cronbach's alpha measure of the refined scale was found 0.76, deemed to be reliable in internal consistency of the items (Tavakol & Dennick, 2011).

Final Survey Development

The final survey was primarily designed to measure participants' knowledge of TA environmental sustainability before and after the experiment. The TAESK scale, finalized by the above refinement procedure, served as the pretest version of the survey. The pretest version measured the participants' TA environmental sustainability knowledge before the experiment began. In additional to the TAESK scale, a few demographic questions were included in the pretest survey (Appendix A).

The posttest survey measured the knowledge of the participants after the experiment was finished (see experimentation). The posttest included the TAESK scale along with a few additional open-ended questions (Appendix B). The qualitative analysis of these open-ended questions reinforced the quantitative findings of the study.

The open-ended questions were designed to explore additional information related to change in the knowledge and attitude of the participants (Appendix B). Knowledge-related open-ended questions were included to identify outside factors (e.g., history) causing knowledge gain as well as explore any shifts in perception of the participants after participating in the study. Similarly, attitude-related open-ended questions were included to explore participants' outlooks towards their general responsibilities and clothing purchases as well as views regarding the TA industry's responsibilities. Overall, these open-ended questions acted as supplementary indicators of knowledge gain as well as helped this researcher to get a broad picture of knowledge gain of the participants.

Table 3.1 Textile and Apparel Environmental Sustainability Knowledge (TAESK) scale

Items of the TAESK scale, Cronbach's Alpha, 0.76
1. During the laundering process, synthetic fabrics shed microfibers which eventually make their way into water bodies and harm aquatic life (TRUE)
2. If residual toxic chemicals from textile processing mix with river water, they eventually end up in the food chain and pose a substantial health risk for humans and other animals (TRUE)
3. Nylon and polyester fabrics are environmentally friendly because they contribute substantially less greenhouse gas emissions than other fibers during production (FALSE)
4. The average American throws away about 80 pounds of used clothing per year (TRUE)
5. Roughly 8,000 different chemicals are used in textile production processes, most of them pose no health risk to human or animals (FALSE)
6. It is very difficult to recycle the wastewater created by textile and apparel dyeing and finishing processes (TRUE)
7. Approximately 17-20% of global water pollution comes from textile dyeing and finishing processes (TRUE)
8. Producing and caring for a pair of denim pants contributes the same amount of greenhouse gas emissions as an average car driven for approximately 80 miles (TRUE)
9. The global clothing industry distributes product around the world without producing harmful levels of carbon emissions. (FALSE)
10. Natural fibers, such as cotton and linen, takes approximately a hundred years to biodegrade (FALSE)
11. During the decomposition process of clothing items in a landfill, harmful chemicals, such as methane and carbon dioxide, are produced (True)
12. Cotton cultivation uses a minimal amount of water and does not pose much threat to global freshwater resources (FALSE)

Procedure

This section discusses the stages involved within the data collection procedure. It begins with providing statement of the use of human subjects and then elaborates on data collection and experimentation procedure. The Experimentation section expands on discussing what content was used in the experiment and how the content was developed and delivered.

Statement of the Use of Human Subjects

This study used an online survey of the participants where participants responded to a study-specific scale, demographics, and a few open-ended questions. In addition, the participants interacted with the posted information on a Facebook page as part of the experiment. They put their reactions, comments, and other identifiable social media activities. These social media activities were analyzed to reach the research conclusion. Before beginning the research, the Institutional Review Board (IRB) of Kansas State University reviewed and approved the research (IRB #8851). “The Institutional Review Board (IRB) is committed to providing a comprehensive and compliant Research with Human Subjects program for researchers, students, and potential human subjects. At K-State, the Committee on Research Involving Human Subjects serves as the IRB and is mandated by federal laws and regulations for oversight of all activities involving research with human subjects” (Kansas State University, 2018, para. 1).

Data Collection

The sample of the study included US citizens aged 18-35. A convenience sampling strategy was used and the participants were recruited through personal contacts, the survey panel (provided by K-State Survey), and K-State Today Student Edition (Appendix C). Once potential participants demonstrating willingness to participate in the study were identified, the researcher

sent an email with a link to a Qualtrics survey to establish eligibility of the participants for the study. The qualifying criteria were:

a) US citizen.
b) Age 18-35.
c) Willing to participate in a discussion regarding textile and apparel industry on a Facebook page for two weeks.

Seventy-three subjects meeting the qualifying criteria were given general information about the study, the responsibilities of participation, and provided a link to the Qualtrics pretest survey. Fifty-one subjects responded to the pretest survey. These participants were given necessary instructions to become a member of the experimental Facebook page. In addition, they were given instructions related to the engagement rule discussed in the following section. Once they became members of the Facebook page, the participants interacted with the content (i.e., experimental treatment) developed by this researcher on the Facebook page (Appendix D) during a two-week period. Once the experimental treatment was over, the posttest survey was delivered. Forty-eight subjects responded to the posttest. A $30 Amazon e-gift card were sent to the participants who completed the full study, which means they responded to the pretest, participated in the Facebook experiment and responded to the posttest.

Treatment

The treatment included participants' interaction with TA environmental sustainability information for a two-week period on an experimental Facebook page. This researcher created the page and had participants following the page before postings began. The series of TA environmental sustainability informational items were scheduled to be posted on the page at a specific time over two weeks. The participants were instructed to indicate their level of

engagement using a system of responses. The system included: a) if they read or viewed the information, they were directed to click a reaction (e.g. like, heart, and smiley face etc.), b) if the information made them pause and think about it, they were directed to add a comment or reply to the post, and c) if the information made them want to act or to do something in response, they were directed to share the post with others. Each post (content or format) received a score based on the level of engagement: one point for a reaction, two points for a comment/reply, and three points for a share (Table 3.2).

Table 3.2 Scoring System for Participants' Engagement

Level of Engagement	**Expression**	**Points**
None: Did not read the post	No expression	0
Low: Viewing the post (reading or viewing) with little to no response.	Clicked a 'Reaction'	1
Moderate: Thinking about the information and having something to say about it. For example, after reading an article a participant might think "That's interesting!", "Really, I did not know this!" etc.	Added a 'Comment' about what he/she is thinking or 'Reply' if he/she agrees/disagrees with other participants	2
High: Responding to the information by wanting more people to know about it. For example, after watching a video one participant thinks "This information is surprising, I need to let others know"; "Hmm! People need to do something about this, I need to share this information"; "Good information, it's worth sharing," etc.	Clicked 'Share' and sent information to another publicly or privately	3

Facebook Page Content Development

This study investigated whether interacting with TA-related environmental information posted on a Facebook page increased participants' knowledge of the issue. Fundamentally, TA-related environmental information entails environmental consequences of TA production,

distribution, consumption, and disposal activities. In other words, it refers to the impact of these activities on the environment. Observing this from another angle, TA environmental impact comes from consuming water, energy, and chemicals in production, distribution, consumption, and disposal phases. Therefore, this researcher developed content related to the four basic aspects (or categories) of TA environmental issues: water, energy, chemical, and waste. The content was carefully chosen from available sources (e.g., YouTube, social media, and websites etc.) with most of them containing citations of the original sources (Appendix D). The researcher included only those information corresponding to what literatures suggested. In addition, the main link of the information was also included in every Facebook page posts. Since, the researcher wanted to provide the participants with the information related to environmental impact of TA industry, the information, as a whole, delineated harmful environmental impact of the industry. Overall, the content was developed with a view to offer participants a basic understanding of TA environmental issues. The content of the posts was determined based on what central information was being delivered by the posts. For example, a post that contained both water and chemical related information, but emphasized TA industry's environmental impact on water bodies from chemical usage, then the post was classified as chemical content. To decide on overall TA environmental sustainability content to be delivered during the treatment, this researcher followed D'Souza, Taghian and Lamb's (2006) proposition of environmental knowledge. They proposed that environmental knowledge has two forms: 1) knowledge of general impact of the products on the environment, and 2) knowledge of the impact of the manufacturing of the products on the environment (p. 2).

Time, Frequency, and Format of the Facebook Page Posting

Post content refers to the type of TA sustainability information shared to inform the subjects and post format recognizes different methods for bringing that information to the subjects. Studies suggest to include involvement messages (such as interacting with fans, asking questions, asking for comment, experience sharing, etc.) during SNS postings (Leung, 2012; Nguyen, 2011; Thomsett-Scott, 2013). However, in this study, the subject-admin (the researcher himself) interaction as suggested by studies was avoided as this researcher wanted the participants to only know the piece of information posted on the page and to seek further details on their own (if desired). The subject-admin interaction would introduce complexities and have the potential to change the scope of the content. Sometimes just a simple interrogatory opening sentence included with the page posting to direct the attention of the subjects to the content was used. For example, when posting a piece of information regarding the issue of chemical aspects of TA sustainability, an opening sentence was included such as "Have you ever thought of the aftermath of your laundry?" to direct the attention of the subjects to the content. As per messaging format, studies stress on using visual posts such as video, infographic, graphics, and images into SNS posts (Leung, 2012; Levy, 2010; Thomsett-Scott, 2013; Steers, 2013; Mawhinney, 2017). After reviewing the above literature, the researcher decided to experiment with video, infographic, and web link formats.

Regarding posting frequency, regular posting is recommended with being careful of not delivering too many posts (Thomsett-Scott, 2013). Information posted on weekends and later in the day usually was found to generate better click-through rates (Zarrella, 2012). Therefore, it was decided to deliver three postings per day, based on Thomsett-Scott's (2013) suggestion, and Friday, Saturday, and Sunday (weekend days) were included in the schedule following Zarrella's

(2012) recommendation. It was also decided that, the posts were to be delivered in the late afternoon and evening as suggested by Zarrella (2012) (Table 3.3).

Table 3.3 Posting Info of Facebook Page

Posting Frequency	6 days/week
Days	Saturday, Sunday, Tuesday, Wednesday, Thursday and Friday
Posting time	12:00-1:00 PM, 5:00-6:00 PM & 8:00-9:00 PM
Posting Formats	Video, Infographic and Web link

Data Processing and Analysis

In investigating the impact of SNS interaction of TA environmental information on the knowledge of TA sustainability knowledge, three research questions primarily guided data collection and analysis: a) whether SNS interaction improved participants' knowledge of TA sustainability, b) what format of SNS posting has a greater influence on knowledge change, and c) what content of SNS posting has a greater influence on knowledge change.

To test Research Question 1, the Wilcoxon Signed-Rank test was used to analyze the data obtained from the pretest and posttest. Wilcoxon Signed-Rank Test is an alternative statistical procedure when one or more assumptions of paired samples t-test need to be compromised to meet the purpose of the study (Woolson, 2008). The provision of including US millennial individuals (age 18-35) in the study rationalizes adopting a non-random, convenience sampling strategy. Wilcoxon Signed-Rank test, from that perspective, was a realistic statistical procedure to analyze the data obtained from a convenience sample. This test is a good statistical tool to

identify statistical difference between two measurements of a matched pair of subjects, after taking care of unmet assumptions of a paired sample t-test, which are:

1. Dependent variable is continuous
2. The subjects are the same in both groups (e.g., pretest and posttest)
3. Samples are random
4. Normal distribution of the difference between two groups
5. No outliers in the difference

On the other hand, qualitative data from open-ended questions, included as a part of the posttest to get additional insight of participants' knowledge change, was analyzed contextually because content analysis gives flexibility to analyze text data (Cavanagh, 1997). More specifically, a conventional content analysis approach was followed in this study. This approach allowed this researcher to generate themes from participants' text data without imposing preconceived themes to the data (Hsieh & Shannon, 2005). In this type of approach, text data are read repeatedly to get a holistic sense of the data, often by highlighting key texts and then organizing texts into conceived categories (Morgan, 1993; Patton, 2002; Tesch, 1990).

A descriptive statistical analysis was utilized to determine the contribution of message format and message content on the level of engagement with the Facebook page posting. The analysis included the total number of reactions, comments/replies, and shares for each format and content area during the experiment (Duke, Hansen, Kim, Curry, & Allen, 2014; Jaffar, 2014).

To assess whether message format and message content influenced participants' knowledge gain, a multiple regression analysis was carried out with specific focus on beta (β) weights. The beta weights indicate relative weights/importance of independent variables to the dependent variable in a regression equation (Johnson, 2000). Therefore, to identify the influence

of different formats on the knowledge gain, the dependent variable 'knowledge gain' was regressed over different formats: video, infographic, and web-link. Similarly, to identify the influence of different contents on the knowledge gain, the dependent variable 'knowledge gain' was regressed over different contents: water, energy, chemicals, and wastes. For example, in the case of identifying influence of different formats on knowledge gain, the regression equation was:

$$\text{Knowledge}_{\text{gain}} = \alpha + \text{video} + \text{infographic} + \text{weblink} + \varepsilon$$

Where,

$\text{Knowledge}_{\text{gain}}$ = Posttest score – pretest score

α = Regression slope

Video, infographic and weblink = Mean engagement score based on assigned points

ε = Error of the model

The dependent variable 'knowledge gain' was calculated by subtracting pretest score form posttest score for each participant. The mean engagement score of both formats and contents was calculated by first obtaining engagement scores for all the posts in each category and then averaging the score for the category for each participant. As discussed before, the participants were directed to give a reaction if they read/viewed a post, comment/reply if the information made them pause and think about it, and share if the information made them want to act or to do something in response. Thus, a reaction was assigned one point, a comment two points, and a share received three points, considering sharing as the highest level of engagement. If a participant did not show any activity (i.e., like, comment, or share) to a post, that post was deemed to be unnoticed by the participant and was assigned zero points. If a participant "reacted" to a post, "commented/replied" something, and then "shared" the post that post was

assigned three points as sharing was considered to be the highest level of engagement in this study.

The average score of the engagement (i.e., like, comment, and share) both for format and content of the post were calculated from the assigned points by keeping only the highest level of engagement. For example, each participant interacted with a total of 12 video posts during the experiment. If a participant got one point (e.g., reaction) for his/her engagement with video-1, two points (e.g., commenting/replying) for video-2, zero points (no engagement activity) for video-3 and so on, then these points were averaged for that participant. Suppose he/she then received an average of 1.5. The same way, the mean engagement score of the participants in each format and content category was obtained. The mean engagement score, thus obtained for both format and content, was regressed with knowledge gain (Appendix E). A summary of data analysis plan is given in Table 3.4.

Table 3.4 Data Analysis Plan

Research Question	**Hypothesis**	**Data Analysis**
RQ 1: Does engagement with TA-related environmental information shared on Facebook improves consumers' knowledge of TA related environmental sustainability?	H1: There will be a significant improvement in the knowledge scores after engaging with posted information related to TA environmental sustainability.	Wilcoxon Signed-Ranks test Qualitative analysis
RQ 2: Which format (i.e., video, infographic, and web link) of TA-related environmental posts shared on Facebook leads to a higher level of engagement?	H 2a: The video format of TA-related environmental posts shared on Facebook will lead to a higher level of engagement than the weblink format.	Descriptive statistics
	H 2b: The infographic format of TA related environmental posts shared on Facebook will lead to a higher level of engagement than the weblink format.	Descriptive statistics
RQ 3: Which format (i.e., video, infographic, and web link) of TA-related environmental posts shared on Facebook have a greater influence on knowledge change?	H 3a: The video format of TA-related environmental posts shared on Facebook will have greater influence on knowledge change than the weblink format	Multiple regression analysis
	H 3b: The infographic format of TA-related environmental posts shared on Facebook will have greater influence on knowledge change than the weblink format.	Multiple regression analysis

RQ 4: Which content (i.e. water, energy, chemicals, and waste) of TA-related environmental posts shared on Facebook results in a higher level of engagement?	Descriptive statistics
RQ 5: Which content (i.e. water, energy, chemicals, and waste) of TA-related environmental posts shared on Facebook has a greater influence on knowledge change?	Multiple regression analysis

Chapter 4 - Findings

This study investigated the impact of SNS engagement on consumers' knowledge of TA-related environmental sustainability. A study specific Textile and Apparel Environmental Sustainability Knowledge (TAESK) scale was administered to 46 subjects who participated in a simple one group pretest posttest experiment. The experiment included a two-week period Facebook page interaction of the participants. The participants had the opportunity to learn about the TA sustainability issue from the Facebook page postings. To better understand whether other factors might be causing knowledge change, a few open-ended questions were also asked during posttest. This chapter presents the findings of the study in relation to the research questions posed.

Demographics of Research Participants

This study used a convenience sample of US millennial individuals (age group 18-35). In addition, the participants also needed to be active Facebook users. The participants were recruited through personal contacts, K-State survey email panel, and K-State today student edition advertisement. The number of participants varied in pretest and posttest. Fifty-one participants responded to pretest survey while 48 participants responded to the posttest. Among those 48 participants in the posttest, one did not sufficiently complete the posttest and another one could not be identified. Therefore, the final analysis was done with 46 participants. Most of the participants were between 18 to 25 years old (86.27%) with the 18-21 age group as the largest participating group (60.78%). Most of the participants were female (almost 80%) and most of them were white/Caucasian. Since the sample included US individuals, a predominantly white/Caucasian race was expected. Likewise, as the recruitment process involved a survey panel of Kansas State University students and a recruitment advertisement in K-State Today Student

Edition, the 18-25 age group (representing college students) was also expected to be large. On the other hand, the reason of greater number of female participants in the study might be due to the use of a Facebook page as the experiment – as females use Facebook more than males (Statista, 2018a). Table 4.1 presents an overview of the demographics of the participants.

Table 4.1 Demographics Information of Research Participants

	Posttest (After Experiment)		**Pretest (Before Experiment)**	
Variables	**Number N= 48**	**Percent**	**Number N= 51**	**Percent**
Age Group				
18-21	28	58.33	31	60.78
22-25	13	27.08	13	25.49
26-29	1	2.08	1	1.96
30-35	6	12.5	6	11.76
Gender				
Male	10	20.83	10	19.61
Female	37	77.08	40	78.43
Other	1	2.08	1	1.96
Prefer not to disclose	0	0.00	0	0.00
Race				
White/Caucasian	40	83.33	43	84.31
Black/African American	1	2.08	1	1.96
Hispanic/Latino	2	4.16	2	3.92
American Indian/Alaska Native	1	2.08	1	1.96

Asian/Asian American	2	4.16	2	3.92
Native Hawaiian/ Pacific Islanders	0	0.00	0	0.00
Others	2	4.16	2	3.92

Data Analysis and Results

The following sections discuss the results from data analysis in relation to the research questions posed in the study. The discussion first presents the analyses (qualitative or quantitative) carried out relating to each research question and then explains the result of the analysis.

RQ 1: Does engagement with TA-related environmental information shared on Facebook improve consumer knowledge of TA-related environmental sustainability?

Quantitative Analysis

To answer this question, a Qualtrics survey link containing the TAESK scale was sent to the participants at the beginning of the study (before the treatment) to measure their knowledge of environmental sustainability of the TA industry prior to exposure to the treatment. After completing the pretest, the participants went through the experimentation where they interacted with various types of environmental sustainability information about the TA industry on a Facebook page for a two-week period. After the experiment was finished, the participants again responded to the same TAESK scale along with some open-ended questions. The pretest and posttest responses were matched with the participants and resulting change in knowledge was calculated by subtracting pretest knowledge from posttest knowledge. Because this research

utilized a non-random, convenience sampling technique, Wilcoxon Signed-Ranks test was used for statistical analysis to see whether there was a change in knowledge gain and whether the change was significant or not. Hypothesis 1, that there will be a significant improvement in the knowledge scores after engaging with posted information related to TA environmental sustainability, was supported. It is evident from the descriptive statistics (Table 4.2) that the posttest knowledge score of the participants improved greatly. The minimum pretest knowledge score was -4 whereas the minimum posttest knowledge score increased to 2. Moreover, the mean posttest score (7.17) was a lot higher than mean pretest score (3.74).

Table 4.2 Descriptive Statistics

	N	Mean	Standard Deviation	Minimum	Maximum	Percentile		
						25th	50th (median)	75th
Pretest Score	46	3.74	2.947	-4	10	2.00	4.00	5.25
Posttest Score	46	7.17	2.652	2	12	5.00	7.00	9.00

Note: The range of the knowledge score was -12 to +12

The rank data in Table 4.3 shows that 40 participants had higher posttest scores (as shown by 'positive ranks' in Table 4.3), which indicates those participants improved their knowledge after the treatment. However, there was no change in knowledge for 2 participants (as shown by 'ties' in Table 4.3) and 4 participants received lower knowledge scores after the treatment (as shown by 'negative ranks in Table 4.3). The test statistics data in the lower portion of Table 4.3 reveals whether the treatment led to a statistically significant change in the mean knowledge score of the participants. It shows that a two-week Facebook interaction, indeed, statistically significantly changed the knowledge of TA industry-related environmental sustainability of the participants ($Z = -5.274$, $p < 0.001$).

Table 4.3 Wilcoxon Signed-Ranks Test

Ranks				
		N	**Mean Rank**	**Sum of Ranks**
Posttest Score- Pretest Score	Negative Ranks	4[a]	11.13	44.50
	Positive Ranks	40[b]	23.64	945.50
	Ties	2[c]		
	Total	46		

a. Posttest Score < Pretest Score
b. Posttest Score > Pretest Score
c. Posttest Score = Pretest Score

Test Statistics [a] Posttest Score- Pretest Score	
Z	-5.274[b]
Asymp. Sig. (2-tailed)	0.000

a. Wilcoxon Signed-Ranks Test
b. Based on Negative Ranks

Qualitative Analysis

To better understand what might have triggered the knowledge change of the participants, Facebook comments/replies of the participants were analyzed. Facebook comments/replies of the top 10 participants who improved their knowledge the most after treatment is shown in Table 4.4. A full list of comments/replies is provided in Appendix F.

Table 4.4 SNS Interaction of Top Ten Participants

Subjects	Knowledge Gain	Water	Energy	Chemical	Waste
01	10	N/C	"52 micro seasons" that's a lot	"wow, interesting read"	N/C
02	10	"sometimes stuff like this almost feels pointless because the common person may want this to change, but how could we ever get big companies to change" "I like the list at the end- it was helpful. But, if feels like no matter what we do we're wasting water and leaving a carbon footprint and damaging our world and it's frustrating"	"This makes me want to at least start hang drying my clothes. I've never really thought about what washing and drying my clothes does"	"Would hand washing and hang drying make anything better?" "Where is the 'what can be done' portion?	I wish more people I knew recycled their clothing and I wish there were more ways and places to recycle textiles" "Where do I take my clothes to recycle?"
03	8	N/C	"Surprising to think about the amount of water we could conserve from one less pair of jeans made"	N/C	N/C
04	8	N/C	N/C	N/C	N/C
05	7	"Very Interesting. It leaves me with many questions. Are there ways to produce textiles without creating toxins? How can we get other countries or at least American companies in other countries to deal with the toxins in a safe way"? "this comes after agriculture as if agriculture was wasting the water. Food is fairly important, and irrigation prevents tragedies like the Dust Bowl. From my understanding, the water used in cotton production and washing clothes can be cleaned and reused with little difficulty" "I would definitely get on board with proposed solutions. If there is a better way to do things, or if It could be researched, that would be fantastic"	N/C	N/C	"I agree. I also think the textile industry could help out more by making clothes the last longer and which aren't see through to begin with"

		"This one left me confused. It is really unspecific about possible alternatives to the things it's suggesting we eliminate" "That's really surprising. I would have thought it would have been the other way around"			
06	7	"Long time Nike fan but I sure hope they are starting to take different measures to clean up their processes since the release of this video" "It makes me wonder why the clothing industry hasn't found a more efficient/less wasteful product to use than cotton" "It's pretty neat they were able to find an alternative to cotton, even though it didn't have the same traits as cotton"	"I am a big fan of good fitting pair of jeans and it's too bad that the processes behind making denim is harmful"	"I've always found this to be highly alarming. It makes you wonder what marine life could be without all the pollution"	"I definitely had a conversation with someone about this the other day and it amazes me the amount of waste that is produced just around the fashion/clothing industry"
07	7	N/C	N/C	N/C	N/C
08	6	N/C	N/C	N/C	N/C
09	6	N/C	N/C	N/C	"Would shopping our own thrift stores before going to a new store help this problem at all? Or just wearing what we have?
10	6	N/C	N/C	N/C	N/C

The comment/reply data of Table 4.4 shows that although some of the participants were commenting/replying on the Facebook page more regularly (e.g., subjects 5 and 6), their knowledge gain was less than those of the participants commenting/replying occasionally (e.g., subjects 1 and 4). Therefore, the participants showing better knowledge gain might have closely followed the Facebook posts, but did not comment/reply for some unknown reason. This led to the determination that participants' commenting/replying practices provided inconclusive information and led to an inability to make any inference on what might have triggered the knowledge gain.

As part of the posttest, participants answered a question regarding the source of their knowledge gain (Table 4.5). The data shows that 75% (n=36) of the respondents did not use any other source except the Facebook postings to learn about the environmental sustainability issue of the TA industry. Therefore, the knowledge gain of those two-thirds of participants can clearly be said to be impacted by the experiment.

Table 4.5 Source of Knowledge Gain

	Yes		No	
Question	**Number**	**Percent**	**Number**	**Percent**
Did you explore additional information about the environmental impact of the textile and apparel industry beyond the postings on the Facebook posting over the last two weeks?	12	25	36	75

The participants also self-reported their perception about the TA industry and consumers. The Table 4.6 shows that 87.5% (n=42) participants reported that the participation in the Facebook page experiment changed their perception of TA industry positively. Similarly, 89.6%

(n=43) participants reported that the participation changed their perception of consumer's responsibility and their use of clothing.

Table 4.6 Participants' Perception of TA Industry and Consumer

	Yes		No	
Question	**Number**	**Percent**	**Number**	**Percent**
Did participation in this Facebook experiment change your perception of the textile and apparel industry?	42	87.5	6	12.5
Did participation change your perception regarding consumers' responsibility and their use of clothing?	43	89.58	5	10.42

Finally, the participants responded to three attitude-related open-ended questions regarding personal responsibility, purchasing decisions, and the TA industry's responsibility. Following conventional content analysis approach (Hsieh & Shannon, 2005), the researcher read the responses several times to identify and organize themes. The responses showed various important aspects of consumer responsibilities shown in Table 4.7.

Table 4.7 Identified Themes from Participant's Responses as Related to Personal Responsibility, Purchasing Decision and Industry Responsibility

Question Type	**Question**	**Theme**	**Mention**
Personal Responsibility	How did the information make you think about your responsibility for reducing the environmental impact of clothing?	Conscious consumption	6
		Long-term use /Reuse	6
		Buying less	4
		Clothing recycle	4
		Clothing disposal	4
		Collective effort	4
		Washing less	3
		Avoiding bad companies	3

		Donating	2
Purchasing Decision	How might this new understanding impact your clothing purchases and use, If any, how? If not, why?	Conscious consumption	20
		Buying less	8
		Buying used clothes	4
		Long-term use	4
		Buying higher quality clothes	3
		Confused	3
		Washing less	1
		Donating	1
TA Industry's Responsibility	From your perspective, how should the textile and apparel industry take responsibility for protecting the Environment?	Eco-friendly production practices	23
		Strict regulations	10
		Proper disposal	4
		Workers working condition	2
		Raise awareness	2
		Eco-friendly shipping	2
		Recycling	2
		Publicly reporting of environmental impact	1
		New technology	1

As seen in Table 4.7, the participants emphasized conscious consumption (total mentions=26) both in their responsibilities towards reducing environmental impact, as well as clothing purchasing. To be more specific, they frequently mentioned selecting environmentally-friendly materials during clothing purchasing and being mindful in consumption. Other frequent mentions were buying less (n=12), long-term using (n=10), washing less (n=4), recycling (n=4), and donating (n=3). On the other hand, most participants mentioned that the TA industry should follow eco-friendly production practices (n=23). They also emphasized stricter environmental regulations (n=10). Other participants emphasized proper disposal of industry wastes (n=4), raising awareness (n=2) and eco-friendly shipping (n=2).

RQ 2: Which format (i.e., video, infographic, and web-link) of TA-related environmental posts shared on Facebook leads to a higher level of engagement?

A descriptive analysis was conducted to answer this question. The total number of reactions, comments/replies, and shares associated with each format (i.e., video, infographic, and web-link) was observed to assess the engagement of the participants with each post. In addition, an aggregated engagement score for each format was calculated following the scoring system of engagement previously shown in Table 3.2. A summary of the participants' engagement scores as related to post format is given in Table 4.8.

Table 4.8 Engagement Related to Post Format

Post Format	Total no. of Postings	No. of reactions	No. of comments/ replies	No. of Shares	Aggregated Engagement Score
Video	12	363	63	5	504
Infographic	12	377	53	3	492
Weblink	12	359	44	1	450

Both hypothesis 2a and 2b, that the video and infographic format of TA related environmental posts shared on Facebook will lead to a higher level of engagement than the weblink format, received some support. The data in Table 4.8 reveals that the participants scored slightly higher with the video format in aggregated score (504), total number of comments/replies (63), and shares (5) compared to infographics and weblinks. On the other hand, participants reacted the most with infographic format (377), although scored lower both in shares (3), and aggregated score (492), than those of video format (share=5, aggregate score=504). Participants scored least in all three engagement indicators of weblink format (reactions=359, comments/replies=44, shares=1, aggregate score=450). Overall, engagement

related to post format can be ranked (descending order) as video (504), infographic (492), and weblink (450), considering aggregated engagement score.

RQ 3: Which format (i.e., video, infographic and web-link) of TA-related environmental posts shared on Facebook has greater influence on knowledge change?

To determine which format of information had the greatest influence on knowledge change, a multiple regression analysis was conducted by regressing knowledge gain with the mean engagement score obtained for different formats. The knowledge gain of the participants was calculated by subtracting the pretest knowledge score from the posttest knowledge score. The score for each Facebook post format was achieved by following the engagement rule (see Table 3.2). The scores thus achieved for each format type were then averaged for each participant (Appendix E).

Both hypothesis 3a and 3b, that the video and infographic format of TA-related environmental posts shared on Facebook would have greater influence on knowledge change than the weblink format, was neither supported nor rejected due to limited information from the multiple regression analysis. The result from multiple regression analysis, by taking knowledge gain as the dependent variable and the mean engagement score of formats (i.e., video, infographic, and weblink) as independent variable, is given in Table 4.9. Specific consideration was given to the beta co-efficient. It should be noted that beta coefficients show the explanatory power of the variables in that beta coefficients indicate the relative weights or importance of each independent variable to the dependent variable (Johnson, 2000).

Table 4.9 Regression Analysis for Predicting Influential Post Formats to Knowledge Gain

Knowledge Gain	**Coefficients**	**Standard error**	**Beta**	**t**	**Sig. (p> t)**
Video format	3.145	2.460	0.436	1.28	0.208
Infographic format	-6.514	3.210	-0.882	-2.03	0.049
Weblink format	4.501	2.808	0.588	1.60	0.117
Constant	2.884	1.001	-	2.88	0.006

The regression relation found from the analysis was not significant [F (3, 42), p=0.16]. In addition, the beta coefficients of video (β=0.436, t= 1.28, p= 0.208), and weblink (β=0.588, t= 1.60, p= 0.117) shown in the Table 4.9 were not significant. Although, the beta coefficient of infographic (β=-0.882, t= -2.03, p= 0.049) was found to be significant at the 95% level, the negative sign found was contrary to the common understanding. It is logically understandable that if participants watched more infographic-type posts, their knowledge gain would have been better. However, contrary to logical understanding, the negative sign of the beta coefficient associated with infographic suggests that knowledge gain would be lower if engagement associated with the infographic post went higher.

The above findings lead this researcher to check the multicollinearity problem of the variables. Multicollinearity occurs when variables tested in a study are correlated with each other. Variance Inflation Factor (VIF) is a good indicator of multicollinearity. If VIF is greater than 4.0 for any independent variable, that is a sign of a multicollinearity problem. Also, another good indicator of multicollinearity is bivariate correlations of the variables being studied. Any

bivariate correlation greater than 0.7-0.8 is a sign of multicollinearity (Berry and Feldman, 1985). A summary of VIF is given in table 4.10 and bivariate correlation in Table 4.11.

Table 4.10 Variance Inflation Factor of Independent Variables; Post Formats

Post Formats	**Variance Inflation Factor (VIF)**
Video	5.52
Infographic	8.94
Web link	6.39

Table 4.11 Bivariate Correlations of the Variables, Post Formats

	Knowledge gain	**Video**	**Infographic**	**Web link**
Knowledge gain	1.000			
Video	0.147	1.000		
Infographic	0.050	**0.901**	1.000	
Web link	0.156	**0.858**	**0.915**	1.000

From Table 4.10 and 4.11, it can be easily seen that the independent variables of the regression model were highly correlated with each other. This information led this researcher to address the problem, as discussed below.

Dealing with Multicollinearity

"The best solution for multicollinearity is to *obtain more information"* (Berry & Feldman, 1985, p. 48). If increasing the sample size is possible, that can be done to obtain more information. However, increasing the sample size does not always help to resolve the problem. In this case, increasing sample size would have been difficult because of the experimental research design. One of the other options is to combine two or more independent variables that are highly

correlated into a single variable and then using the composite variable in place of the correlated variables in the regression. In this case, combining independent variables into a single composite variable was contrary to the underlying concepts and research questions posed. Another strategy of overcoming multicollinearity is to omit the variable that is causing the problem from the regression equation. Since more than one variable caused problem in this study, omitting the variables was not a good option either.

Considering the above shortcomings when dealing with multicollinearity, the most reasonable course of action for this study was, "… to recognize its presence but live with its consequences" (Berry & Feldman, 1985, p. 50). Berry & Feldman (1985) mentioned, "unfortunately, when multicollinearity is extreme, one must simply need to accept that the data available does not contain sufficient information to obtain estimates for individual regression coefficients that yield narrow confidence intervals" (Berry & Feldman, 1985, p. 50). Therefore, the bottom line is that the regression analysis to estimate the influence of different formats on knowledge gain did not provide sufficient information. That left the researcher with a limited conclusion of the influence of different formats on knowledge gain.

RQ 4: Which content (i.e. water, energy, chemicals, and waste) of TA-related environmental posts shared on Facebook results in a higher level of engagement?

A descriptive analysis was conducted to answer this question. The total number of reactions, comments/replies, and shares associated with each content type (i.e., water, energy, chemical, and waste) was observed to see the engagement of the participants with each content type. In addition, the aggregated engagement score for each content type was calculated following a scoring system of engagement shown in Table 3.2. A summary of the participants' engagement score related to post content is given in Table 4.12.

Table 4.12 Engagement Related to Post Content

Post Content	Total no. of Postings	No. of reactions	No. of comments/ replies	No. of Shares	Aggregated Engagement Score
Water	9	257	47	3	360
Energy	9	272	33	1	341
Chemical	9	268	34	3	345
Waste	9	273	39	2	357

Table 4.12 demonstrates that the participants reacted slightly more to waste- (n=273), and energy-related (n=272) content. In terms of comments and replies, water-related content was top (comments/replies=47) followed by waste-related content (comments/replies=39). On the other hand, participants shared water- (shares = 3) and chemical- (shares = 3) related posts more than other content types. In terms of aggregated score, participants topped with water-related content (aggregated score=360) closely followed by waste-related content (aggregated score=357). Energy-related content received the lowest score in comments/replies (33), shares (1), and aggregated score (341). Overall, engagement related to content types can be ranked in descending order as water (360), waste (357), chemical (345), and energy (341) considering the aggregated engagement score.

RQ 5: Which content (i.e. water, energy, chemicals, and waste) of TA-related environmental posts shared on Facebook has a greater influence on knowledge change?

A multiple regression analysis was conducted by regressing knowledge gain with the mean engagement score obtained for different content types (e.g., water, energy, chemical, and waste). The knowledge gain of the participants was calculated by subtracting the pretest knowledge score from the posttest knowledge score. The engagement score for each Facebook

post content was achieved following the previously outlined rules (see Table 3.2). The scores thus achieved for each content type were then averaged for each participant (Appendix E).

Afterwards, a multiple regression analysis was carried out by taking knowledge gain as the dependent variable and mean engagement score for different contents (i.e., water, energy, chemicals, and waste) as independent variables (Table 4.13). The focus was on the beta coefficient to see the influence of different contents on the knowledge gain of the participants.

Table 4.13 Regression Analysis for Predicting Influential Post Contents to Knowledge Gain

Knowledge Gain	**Coefficients**	**Standard Error**	**Beta**	**t**	**Sig. (p> t)**
Water content	-2.259	2.296	-0.323	-0.98	0.031
Energy content	0.812	2.868	0.108	0.28	0.779
Chemical content	-3.238	2.923	-0.434	-1.11	0.274
Waste content	5.586	3.050	0.765	1.83	0.074
Constant	2.910	1.034	-	2.81	0.007

The regression relation found from the analysis was not significant [F (4, 41), p=0.36]. In addition, the beta coefficients of energy (β=0.108, t= 0.28, p= 0.779), chemical (β= -0.434, t= -1.11, p= 0.274), and waste (β=0.765, t= 1.83, p= 0.074) shown in Table 4.13 were not significant. Although, the beta coefficient of water (β=-0.323, t= -0.98, p= 0.031) was found to be significant in the 95% level, the negative sign found was contrary to the common understanding. A negative sign was also found in the case of chemical. It is not logically

acceptable that if participants engaged in more water and chemical-type posts, their knowledge gain would be lower.

The above findings led this researcher to check the multicollinearity problem of the variables. Multicollinearity occurs when variables tested in a study are correlated with each other. Variance Inflation Factor (VIF) is a good indicator of multicollinearity. If VIF is greater than 4.0 for any independent variable, that is a sign of multicollinearity problem. Also, another good indicator of multicollinearity is bivariate correlations of the variables being studied. Any bivariate correlation greater than 0.7-0.8 is a sign of multicollinearity (Berry and Feldman, 1985). A summary of VIF is given in Table 4.14 and bivariate correlation in Table 4.15.

Table 4.14 Variance Inflation Factor of Independent Variables; Post Contents

Post Formats	**Variance Inflation Factor (VIF)**
Water	4.90
Energy	6.64
Chemical	6.99
Waste	7.94

Table 4.15 Bivariate Correlations of the Variables; Post Contents

	Knowledge gain	Water	Energy	Chemical	Waste
Knowledge gain	1.000				
Water	0.062	1.000			
Energy	0.121	**0.878**	1.000		
Chemical	0.094	**0.824**	**0.871**	1.000	
Waste	0.189	**0.847**	**0.882**	**0.915**	1.000

The discussion of dealing with multicollinearity problem was presented in the previous section under Research Question 3. The bottom line was that the regression analysis to estimate the influence of different content types on participants' knowledge gain did not provide sufficient information.

Overall, both qualitative and quantitative findings provided in this chapter represented few key points. Firstly, the SNS was found to have potential to improve the knowledge of the participants about TA-related environmental issues. In addition, the participants reported that the experiment changed their perception of TA industry as well as their use of clothing positively. Secondly, the video and infographic formats were found to be more effective than weblink format in generating more SNS engagement. Thirdly, water content of TA environmental information generated more SNS engagement followed by waste, chemical and energy content. Fourthly, no conclusion could be made regarding the influence of different formats (i.e., video, infographic and weblink) and contents (i.e., water, energy, chemical and waste) on the knowledge gain of the participants.

Looking into the raw data used for regression analysis, it was found that the multicollinearity occurred because a participant who reacted/commented to a video post also reacted/commented to an infographic post. Similarly, a participant who reacted to a water content post also reacted to a waste content post. This might have happened because a post which contained primarily water related information also included waste related content. As a result, participants' demonstration of post engagement were not noticeably different. Future studies might arrange more robust experiment with more distinguished contents, for example, purely water content in one post and purely waste content in another post to see if the strategy produces noticeably distinguishable post engagement.

Chapter 5 - Discussion and Conclusion

This final chapter begins with a summary of the research questions, methodology used, and findings obtained. Then, the chapter provides an integrated discussion of the research findings in relation to previous research findings in the literature base. The chapter concludes with an articulation of the implications and limitations of the research as well as recommendations for future research.

Summary of Research Questions

The study investigated whether engagement with TA-related environmental information posted on a Facebook page increased participants' knowledge of the issue. In addition, the study investigated what format and what content type of TA environmental sustainability informational postings on the Facebook page made the participants more engaged and what led to greater knowledge increase. The following specific research questions guided the investigation:

RQ 1: Does engagement with TA-related environmental information shared on Facebook improve consumers' knowledge of TA-related environmental sustainability?

RQ 2: Which format (i.e., video, infographic, and weblink) of TA-related environmental posts shared on Facebook leads to a higher level of engagement?

RQ 3: Which format (i.e., video, infographic, and web link) of TA-related environmental posts shared on Facebook has greater influence on knowledge change?

RQ 4: Which content (i.e. water, energy, chemicals, and waste) of TA-related environmental posts shared on Facebook results in a higher level of engagement?

RQ 5: Which content (i.e. water, energy, chemicals, and waste) of TA-related environmental posts shared on Facebook has a greater influence on knowledge change?

Summary of Research Design

This study tried to understand whether SNSs have any potential for improving participants' knowledge of environmental sustainability related to TA production, distribution, consumption, and disposal practices. As environmental sustainability includes various aspects (for example, water, chemical, etc.), the study investigated what specific environmental sustainability content of the TA industry influenced participants' knowledge the most. In addition, the study also investigated what format of TA industry-related environmental sustainability information posted on Facebook influenced participants' knowledge the most.

A simple one group pretest-posttest experimental design was used. The study employed a Facebook page as a representative platform of social networking sites and US millennial individuals (18-35 age group) as participants. To measure participants' knowledge of TA-related environmental sustainability, a study-specific 12-item TAESK scale was employed. Prior to the treatment, the knowledge of the participants was measured using the developed TAESK scale. Afterwards, a set of preplanned TA environmental sustainability-related content was posted at prescheduled times on the Facebook page for two weeks. The content covered four main aspects of TA industry-related environmental sustainability: water, energy, chemical, and waste. This content was posted in three different formats, namely video, infographic, and weblink. The participants interacted with this environmental sustainability content. After the experiment was over, the knowledge of the participants was measured again. Knowledge gain of the participants was calculated from knowledge scores in two different points of time. To understand whether there were external factors that might be causing knowledge gain, an open-ended question was included in the posttest. The comments of the participants from the Facebook page were gathered and analyzed to observe the connection of the Facebook page activity to knowledge gain.

Additionally, a few open-ended questions were employed to find additional insights related to participants' perception and attitude towards the issue.

To investigate which specific format of Facebook posts and specific content of TA industry-related environmental sustainability information influenced knowledge gain the most, a study-specific engagement scoring system was used. These scores were then used in multiple regression analysis with specific focus on beta weights to find the influence of different formats and contents on the knowledge gain.

Summary of Data Analysis

This study used both quantitative and qualitative analysis to understand the potential of SNSs to stimulate knowledge gain of the participants. Analysis was also carried out to find the influence of different formats and contents of Facebook page postings on participants' knowledge. A Wilcoxon Signed-Rank test was conducted to see whether the posttest knowledge score changed significantly from the pretest knowledge score. Participants' comments/replies from the Facebook page were analyzed contextually to study the connection of commenting with knowledge gain. Responses from open-ended questions were analyzed contextually to identify themes. Descriptive statistics were used to find the impact of post format and content on participants' Facebook page engagement. Multiple regression analysis was conducted with specific focus on beta weights to see the influence of post format and content of Facebook posts upon knowledge gain.

Discussion of Research Findings

The following section discusses research findings and presented by the research questions posed in the study. During discussion, linkage to relevant literature is made when appropriate.

RQ 1: Does engagement with TA-related environmental information shared on Facebook improve consumer knowledge of TA-related environmental sustainability?

Learning is a social process. Social interaction and information sharing with each other facilitates learning (Bruner, 1996). SNSs provide a unique opportunity for social interactions to happen virtually (Ajjan & Hartshorne, 2008). A virtual network of people brings collective power to generate and assimilate information. Benkler (2006) argued that online participation makes people more critical, self-reflective, and collectively intelligent through opinion sharing. Greenhow (2009) pointed out that SNSs can be "social learning resources and spaces for new literacy practices" (p. 11). From this perspective, this study tried to understand whether SNS engagement increased TA-related environmental sustainability knowledge among users. This study found a statistically significant increase of participants' knowledge scores after they interacted with the Facebook postings. This finding supports conclusions from previous research studies. For example, interacting within a Facebook application called 'Hot Dish' improved knowledge of climate change science and environmental behavior of its users (Robelia et al., 2011). Cain and Policastri (2011) reported a significant increase of exam scores of the participants interacting with pharmacy-related content in a Facebook group. Students participating in a MySpace exercise also gained higher points in the assessment given in Kennelly's (2009) study. Tlebere et al. (2016) also reported an improvement of environmental

knowledge of the participants after participating in a 4-week experiment on a social media platform called SMENA.

The findings from above literature, as well as this study, suggest that SNSs have the potential to increase their users' knowledge and can be used as educational tools. Today, the world is facing many environmental problems including ones associated with the TA industry. Continuing with current production and consumption practices will not be able to solve the environmental problems resulting from those practices. Therefore, a novel and more environmental sustainable approach needs to be adopted, replacing old environment-depleting practices, in every personal and industrial domain. For that to happen, it is first necessary for everybody to be environmentally informed, knowledgeable, and literate. SNSs, today's superpowers that can spread information in minutes, should surely be used to serve that purpose. Environmental organizations, such as WWF (www.worldwildlife.org), Greenpeace International (www.greenpeace.org), and Sustainable Apparel Coalition (www.apparelcoalition.org) etc. should take the initiative to spread environmental information among masses using SNSs. The bright side of such SNS campaigning is that chances would be higher for knowledgeable consumers to make responsible consumption decision under favorable conditions.

However, this study did not provide enough information regarding which Facebook posts might have triggered knowledge gain of the participants. The participants' commenting/replying on the Facebook page showed no direct clue to speculate relation between Facebook page activity and knowledge gain. Some participants showed low Facebook page activity while others showed relatively greater knowledge scores (for example, Participants 1 and 4) and vice versa. When asked about engagement, a participant in a study conducted by Fauville et al. (2015) responded, "If I find the story a "jaw-dropper", I'll definitely hit the share button, put in some of

my personal comments and observations, and send it on its way to the post" (p.64). Perhaps, some participants showing greater knowledge gain in this study did not find some posts as "jaw-droppers." Since participants' finding a story as a jaw-dropper is highly subjective, this area warrants more investigation.

RQ 2 & 3: Which format (i.e., video, infographic, and web link) of TA-related environmental posts shared on Facebook leads to a higher level of engagement and greater knowledge change?

People receive, process, engage, and disseminate information in different ways. In a SNS platform, they usually engage with posts having good appeal to them or resonance with their own thoughts. In this study, participants showed more engagement with video-type posts than that of weblink-type posts. Videos present data in more lively and entertaining ways than text does (e.g., weblink). This finding is well-supported by other studies. For instance, in a survey conducted by Usurv, UK people were found to be more likely to share, comment, and like an online video more than they were a text post (Steers, 2013). In another study dealing with a smoking cessation program, information posted in video format generated more engagement than text posts (Duke, et al. 2014). Fauville et al. (2015) also reported that the video posts received a higher reach to the users than text posts.

Similarly, participants of this study showed more engagement with infographic-type posts than that of weblink-type posts. This was understandable because Facebook posts get 2.3 times more engagement with images than those with texts (Mawhinney, 2017). Other studies also revealed similar results. For example, information posted in image formats generated more reach and engagement within participants (Duke, et. al., 2014; Fauville et. al. 2015). Therefore, it

would be good to keep in mind that video and infographic formats are better than weblink-type formats to increase post engagement while campaigning TA environmental sustainability information over SNSs.

Regarding post format's influence towards knowledge change, the regression analysis conducted in this study provided limited information. More information is needed to reach the conclusion. As mentioned earlier, it is difficult to know which post might have triggered the knowledge change. Infographics present information visually in a quick and clear way, step by step, and sometimes in a story-telling fashion. This type of info visualization helps users receive, process, and remember information for long time (Mawhinney, 2017), but may be less engaging than video-type posts because videos present info in more lively and entertaining ways. Perhaps this was the reason why participants in this study showed better engagement with video. After all, it is hard to tell what type of post will lead to a higher knowledge gain of users because it depends on users' cognitive processing ability. It can be concluded that video and image or infographic posts lead to better engagement, thereby creating the possibility of more knowledge gain than simple text posts.

SNSs campaigners, marketers as well as sustainable TA brands and retailers can utilize the findings that video and infographic generate more post engagement than weblink format during spreading information. They can further study how different size and duration of videos affect SNS engagement. In addition, it would be interesting to see how different types of video visualizations with the same length affects SNS post engagement. Similar investigations can also be conducted with infographic formats to understand better strategy with the formats.

Research Question 4 & 5: Which content (i.e. water, energy, chemicals, and waste) of TA-related environmental posts shared on Facebook result in a higher level of engagement and greater knowledge change?

People care about the things they value the most and that have a direct impact on their lives. Consumers may engage with a SNS post more if the post contains an issue they care about and perceive has a direct impact on their life. The four aspects of TA environmental sustainability communicated in this study through the Facebook page experiment were water, energy, chemical, and waste. The findings of this study revealed that participants showed a higher level of engagement with water-related content closely followed by waste-content. This might have occurred because participants could visualize the impact on water on their daily lives. It is relatively easier to understand a water-related impact on one's life than energy-related impact. Understanding the impact of energy consumption-related issues requires understanding of greenhouse gas issues and consequent climate change. People showed poor knowledge of understanding this climate change issue and the underlying science associated with it (Leiserowitz, Smith, & Marlon, 2011; Tobler, Visschers, & Siegrist, 2012). On the other hand, waste generation resulting from overconsumption of TA goods might have also been easy to relate with participants' personal lives. This may be why participants also showed relatively higher engagement with posts containing TA waste-related issues.

These findings have far-reaching implications of social media campaigning for TA environmental sustainability. As consumers showed a higher level of engagement with water and waste-related content of Facebook posts, it is presumed that they care about those aspects of TA sustainability more. Therefore, during social media campaigning, these aspects of TA environmental information should be emphasized more. If consumers become knowledgeable of

water pollution resulting from their clothing care, it is likely that they would be more careful about unnecessary laundering and detergent-using habits. Reduced consumer laundering practices has a huge impact on the environment in terms of water consumption and pollution as well as greenhouse gas generation. To give an example, doing one less clothing wash cycle per household in USA could have saved 54 million KWh of electricity in 2017 alone. The calculation was made considering 126.22 million people in US in 2017 (Statista, 2018b) and 0.43 KWh per wash cycle (Pakula & Stamminger, 2010). Moreover, this change in practice, would incentivize consideration of new TA products requiring less washing or those with self-cleaning properties. Similarly, consumers becoming aware of the waste they generate from their throwaway habit of fast-fashion clothing will have a huge impact on environmental sustainability. For example, reducing one pound of TA waste each person in USA will reduce about 331 million pounds of TA waste in 2019 alone (PopulationPyramid.net, n.d.). In addition, wasting less clothing alternatively might lead to buying less clothing. Which means a new consumer culture of slow fashion would emerge which is a reportedly positive shift towards TA sustainability (Fletcher, 2010).

However, the current study provided limited information toward understanding of influence of the content of different posts on participants' knowledge gain. Discussed earlier, it is very difficult to know which post content type might have triggered the knowledge change to occur because information receiving, processing, and retaining are highly subjective. It might happen that someone likes a post (which shows good engagement) but does not retain the info in their memory. Conversely, it might happen that someone instantly catches a piece of information but does not like, comment, or share for some reason. Therefore, this area of understanding necessitates more investigation.

Discussion of Themes Identified from Open-Ended Questions

As part of the posttest, the participants commented on their thinking about their personal responsibilities and purchasing decisions, as well as the TA industry's responsibilities. The three most frequently mentioned themes emerged from their responses regarding personal responsibilities and purchasing decision were: conscious consumption, long-term use, and buying less. On the other hand, three most-mentioned themes emerged from their response related to the TA industry's responsibilities were: eco-friendly production, following regulations, and proper disposal.

Under conscious consumption theme, one participant mentioned, "It made me want to be more conscious of the types of clothing I am buying and making sure that I don't have a negative impact on the environment." Understandably, this participant wanted to reduce his/her impact on the environment by perhaps ensuring that the clothing he/she is buying does not have a negative impact on the environment. Although thinking of this kind of responsibility is easy, translating this into action is somewhat difficult. The reason is that there are so many internal and external barriers involved with this (Hiller Connell, 2010), and the lack of knowledge is one of the main barriers (Kim & Damhorst, 1998). In a similar tone, another participant replied, "The information on Facebook made me think that we all need to reduce the environmental impact of the clothing. I never knew how bad it was, so I think if people spread the word more, then that will help reduce the harmful impact. This participant accepted his/her role in reducing the environmental impact of clothing. He/she also thought that that spreading more information would be useful. Another one pointed out, "It made me realize that I throw out a ton of clothes, and if each person is more careful with their clothing, it can make a big difference in the end." This participant also seemingly recognized the role he/she could play in reducing the

environmental impact of clothing. However, it is not clear from the comment what he/she meant by “careful with clothing”.

All the above responses of participants suggest that the participants realized and accepted their role in reducing environmental impact of the clothing. This is one of the main takeaways from their responses, as well as from this study, that if consumers get information about the impact of their clothing consumption, it improves their knowledge and awareness. This knowledge, afterwards, might shape their informational belief as suggested by Ajzen & Fishbein (1975), which under favorable condition might influence attitude, intention, and ultimately behavior (Engel & Blackwell, 1982). Previous studies confirmed that this environmental awareness changed their attitudes towards environmental issues (Flamm, 2009; Mosinder, 1998; Kaiser et al., 1999). Moreover, environmental knowledge can also significantly predict environmentally-friendly behavior (Kaiser & Fuhrer, 2003; Levine & Strube, 2012; Polonsky et al., 2012). Therefore, it is necessary to provide TA consumers with necessary environmental information so that they can make environmentally informed clothing consumption choices.

Under the themes of long-term use of clothing and buying less clothing, one participant responded, “It makes me want to throw away less clothes and use the ones I have more”. Another one replied, “It makes me think about taking good care of my current wardrobe rather than buying new clothes.” Another similar response was, “it made me more self-aware on how I was treating old clothes I throws away or donate.” These participants demonstrated their desire to take good care of clothing, throw away less, and buy less clothing. The themes that emerged from these responses can be mostly matched with the ‘slow fashion’ term largely discussed in the literature. Slow fashion is a “…vision of sustainability in the fashion sector” representing ‘…a blatant discontinuity” and “…a break from the values and goals” of today’s fast fashion

trend (Fletcher, 2010, p. 262). Slow fashion advocates less buying and more long-term use of apparel. The main benefit of buying less clothing is that it reduces negative environmental impact of consumers at the source. More clearly, if a consumer buys a piece of clothing, he/she cannot reduce the impact it has made in its production and distribution phase. Therefore, no matter how responsible care he/she takes of that piece of clothing, it would never be better than not buying the piece in the first place.

Although long-term use of existing clothing might be better than buying more clothing, it has some challenges as well. The current understanding is that some types of apparel, such as cotton-made products, have more environmental impact in their care phase than in the manufacturing phase (Allwood et al., 2006). This aspect of consumer responsibility is very difficult to understand as Bulkeley (2000) pointed out that the complexities of science is a barrier to understanding environmental problems and related choice of actions. Therefore, it is necessary to provide consumers with the right information while campaigning to direct them into the right courses of action. The over-arching implication of participants' interests of buying less and long-tern use of apparels is that it will create less waste. Americans currently throw away about 82 lbs. of clothing per person every year (CTR, 2018). Reducing one pound of TA waste from each person in the USA will reduce about 331 million pounds TA wastes in 2019 alone.

In relation to thinking about the TA industry's responsibilities to reduce environmental impact, the three most mentioned themes identified were practicing eco-friendly production, enacting strict regulations, and disposing of wastes properly. Most of the participants emphasized that the TA industry should follow eco-friendly production strategies. They also mentioned that stricter environmental regulations should be in place to reduce TA industry's environmental impact. Under the eco-friendly production theme, one of the participants mentioned, for

example, “They need to put their hearts into it and see what's doing to the environment and the conditions that the workers have to work in. It will raise prices but for a good reason. They can't continue doing this. The earth deserves better.” Interestingly, this particular participant captured all three aspects of TA sustainability (e.g., people, planet, and profit) in his/her comment. Looking into this participant’s knowledge gain revealed that he/she scored four in pretest and eight in the posttest. Therefore, it seemed that this particular participant might have closely followed the Facebook page posts and perhaps learned from other sources as well. Another participant mentioned, “they need to come up with more environmentally friendly ways to produce and ship clothing and better ways to deal with their waste.” This participant identified three key impactful stages of TA manufacturing: production, shipping (or distribution), and waste disposal. Examining this particular participant’s knowledge gain revealed that he/she scored four on the pretest score and 12 (e.g. highest possible score) on the posttest. Again, this participant might seek to learn more from other sources besides Facebook postings. It was interesting to relate a participant’s knowledge gain with their response showing a good sign of awareness. Clearly, their participation in the study improved their knowledge and awareness. Nevertheless, future studies can arrange focus group studies with such participants to understand what other factors besides the experiment (if any) improved their knowledge.

Under the stricter regulations theme, most of the participants insisted on stricter regulations for the TA industry. For example, one participant mentioned, “I believe there should be stricter laws, however I also believe one of the main reasons most textile plants are in poor countries is to avoid US laws. I am not sure how they should take responsibility.” This participant made a good point regarding how to regulate TA production outside the USA. Dealing with this issue is very challenging because each country has its own environmental

regulations. As the developed countries are implementing stricter laws, it seems that environmental problems are being exported to the developing countries (Welters, 2015). Therefore, net contribution towards environmental problems remains partly unrestrained. One of the solutions to the issue might be, as another participant mentioned, "… there should be more regulations and enforcement of filtering/recycling systems in textile plants. Big corporations should be responsible for creating these systems for countries that provide them cheaper labor and cheaper product." In other words, the TA corporations should ensure proper environmental practices wherever they operate. A very similar response was also reported in the Delong et al. (2013) study. When asked who participates in sustainability, one participant replied, "That is the job of the brands to create a huge awareness about the importance of sustainability and living up to it in their business practices and in the design and manufacturing of their products" (p. 63).

However, some of the participants were doubtful about the impact of their action and some of them were confused in their understanding. One participant replied, "… I as a consumer do not think I can make an impact in the producers view on how they treat the environment." This was a thought-provoking response because when consumers believe that they can have a positive impact on the environment, it shows more responsible behavior (Roberts, 1996; Straughan & Roberts, 1999). Therefore, it is necessary to provide consumers with proper information regarding how they can contribute to reduce their impact on the environment. Moreover, the information should be sufficiently robust enough to make them believe that they can make an impact. SNSs have the ability, as demonstrated by their significant knowledge gain and responses to the open-ended questions in this study, to make them informed, aware and responsible.

Implication for Practitioners

This study took a preliminary step to investigate SNSs impact on TA environmental sustainability's knowledge enhancement of consumers. The findings of the study show that interacting in a SNS space improves the knowledge of the users. This result has far-reaching implications to the TA practitioners. TA brands and retailers producing ESA can reach out to consumers thorough SNSs to encourage them to purchase ESA and inform about the impact of purchasing ESA. Clearly put, these brands can create SNS pages presenting how their TA manufacturing and distribution processes are operating within environmental regulations. At the same time, they can spread alternate scenarios of TA manufacturing and distribution processes disturbing environmental balance. This way, they can create a consumer base who is more aware, informed, and conscious in their TA purchasing and consumption practices. Similarly, NGOs, policy making organizations, non-profit associations, as well as environmental advocates, such as the Sustainable Apparel Coalition (SAC) or Textile Exchange, can utilize SNS to build TA environmental awareness among consumers. Social media campaigners of TA sustainably can utilize the findings to set information dissemination strategies. In other words, they can utilize the knowledge from the study that video and infographics engage users more than plain text posts. Spreading more and more TA environmental information through SNSs by these sustainable TA brands, retailers, NGOs, non-profits, and campaigners with a purpose to raise awareness might lead more consumers to follow conscious consumption and generate increasing ESA demand. This might, in turn, create corporate peer pressure of adopting sustainable strategies and producing ESA if more and more brands respond to bringing ESA into the market (DeLong et al., 2013; Garrison & Gutter, 2010).

Implication for Academia

Ongoing efforts are being made to incorporate sustainability aspects into TA curriculum (Armstrong & LeHew, 2014; Landgren & Pasricha, 2011). The findings of this study will give additional incentive to incorporate SNSs in the endeavors. Most college students use at least one type of social media, for example Facebook, and spending time on SNSs has become an integral part of their daily activities (Ellison, Steinfield, & Lampe, 2007; Wiley & Sisson, 2006). They use Facebook primarily as a way of connecting with friends, expressing themselves, and maintaining social relationships with others (Pempek, Yermolayeva, & Calvert, 2009). In so doing, they share information, encounter new information, and generate new ideas. The interplay of this peer to peer information and ideas exchange continuously reshapes their thought processes and ideologies. Educators can capitalize upon this opportunity as a means of developing cognitive dimensions. As Pempek et al. (2009) pointed out "…the popularity of social networking applications could make them a powerful cognitive tool if adapted for academic pursuits and career goals" (p. 237). Therefore, it might be a good idea to incorporate SNS dimensions in teaching sustainability aspects of the TA industry. For example, a SNS page might be created as part of a course where students would comment on different aspects of TA sustainability, give commentary on those issues, and exchange their views on those issues with peers. This way, students would have a good opportunity to rediscover their understandings and reshape their attitudes about the TA sustainability issue.

Limitations

This study had several limitations. For one, a convenience sample was used to conduct the experiment. Secondly, most of the subjects were US Midwestern residents. A larger, more diverse and randomly selected group of people needs to be included in future studies to generalize the findings of the study. Additionally, the millennial age group (18-35) participated in the study. It would be interesting to see how different age groups behave in a similar study. Moreover, people from different cultures might be included in a sample to see if findings differ or remain the same.

The regression analysis used in this study to investigate which format and content of TA sustainability information posted on Facebook leads to greater knowledge gain did not provide enough information. Therefore, more subjects need to be included in the future studies to get more information regarding these variables. In addition, more robust experiment need to be designed to distinguish participant's engagement related to post formats and post contents.

The reliability and validity of the TAESK scale used in the study need to be established in the future studies. This study reported only Cronbach's alpha measure of the scale. Future studies should work on test-retest reliability, content validity and concurrent validity etc. of the scale. In addition, more items might be included in each category (i.e., water, energy, chemical and waste) or few items might be reworded or deleted depending on the reliability the scale produces with the change. The reliability of the subscales measuring knowledge in each category should also be established along with overall reliability of the scale in the future studies.

Above all, the one group pretest-posttest experimental design that was used in the study has its own limitations (Campbell & Stanley, 1971). Although *history* threat was partially lessened by including an open-ended question, other threats might reduce internal validity of the

research. For example, one of the internal threats to the experiment would be *testing*. As the participants responded to the same scale twice, one prior to the experiment, and another after the experiment, it might be that pretest impacted their posttest response. Similarly, pretest might have influenced their responsiveness to the subsequent experimentations. Therefore, these limitations need to be taken into consideration when making specific conclusions related to the findings of the study. As the experiment was run only for two weeks, perhaps *maturation* and *mortality* threat would have negligible impact on the experiment. However, future study should take care of *instrumentation* and *regression* threat. Few set of similar TAESK items need to be produced to measure the TA sustainability knowledge of individuals to see if the items measure the knowledge consistently. Moreover, future studies should use control group design to guard against such threats.

Recommendations

The study took the preliminary step to investigate the cognitive development of SNS users as it pertains to TA environmental sustainability. The study reported a significant gain in knowledge of TA environmental sustainability of the participants after interacting with the Facebook page. Therefore, future studies should investigate how this knowledge gain impacts subsequent belief formation (e.g., informational belief) and attitudinal change regarding TA environmental sustainability. Studies should also investigate if the attitude thus formed predicts environmentally conscious apparel purchasing. Likewise, future studies can examine how this attitudinal change impacted by SNS interaction influences purchase intention of socially sustainable apparel and predicts socially responsible apparel consumption.

From Facebook page interactions, the researcher noticed that the participants demonstrated low level of engagement towards the end of the experiment. In addition, some

participants were consistently engaged through the experiment whereas some participants were not. Therefore, similar types of future studies should design an experiment which can produce consistent level of engagement throughout the experiment. Similarly, Facebook content need to be diverse so that it can appeal to maximum number of the participants to engage them in the experiment for longer span of time.

TA practitioners can utilize the findings of this study as an incentive to conduct various studies. For example, sustainable TA brands can investigate how social media campaigning of their processes and products, by building a conscious consumer base, impacts their bottom line. Besides, they can examine how conscious their consumers become in the process of purchase decision-making after SNS campaigning. Similarly, TA educators should examine whether inclusion of social media or SNS activity in teaching and learning is an effective strategy or not. They should also identify the effective strategy of social media inclusion on the teaching and learning process. They can also examine viability and benefit of incorporating different social media activities during delivering a course.

Conclusion

This study linked social networking sites with textile and apparel environmental sustainability knowledge aspect. One group pretest posttest experimental design was used for the study. Although the design had its own limitations, the study made a preliminary investigation of the potential of SNSs to influence TA environmental sustainability of the consumers. The data analysis included both quantitative and qualitative technique. The study found that interaction in a SNS space could change users' knowledge of a specific issue, and in case of this study, the TA environmental sustainability issue. It also found that information spread in video and infographic format made participants more engaged than weblink format (e.g., text, word etc.). Regarding

content of SNS postings, the study found that water and waste categories of TA environmental sustainability information engaged participants more.

At present, the TA industry is going through a makeover phase. Increased efforts are being made to clean up the industry. Efforts are also being made to make consumers more aware of the impact of TA products and processes on the environment. Sustainable apparel brands and educators are trying to improve environmental awareness of individuals. However, more accelerated shift toward sustainability is needed. That is why diverse avenues and techniques need to be explored to spread awareness of environmental sustainability of TA production and consumption. SNSs can be utilized in this regard as a vast number of people are using these media. One main point this study makes is that individuals need to be knowledgeable of TA-related environmental sustainability and SNSs can be utilized in that regard. Consumer knowledge, which represents cognitive aspect, is an important factor leading individuals towards sustainable consumption. In the process, this knowledge may also shape consumers' attitudes and behaviors (Bator & Cialdini, 2000; Lee, 2011). On the other side, SNSs provide platforms to rapid spreading of information. This rapid spreading can reach out to thousands in minutes to build corporate peer pressure towards adoption of sustainable strategies (DeLong, Goncu-Berk, Bye, & Wu, 2013; Garrison & Gutter, 2010) as well as accelerate consumers' environmental sustainability knowledge acquisition leading to sustainable TA consumption (Bator & Cialdini, 2000; Wang, Yu, & Wei, 2012).

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Appendix A - Pretest Questionnaire

Pretest Survey Questionnaire

Demographic Questions

1. I identify my gender as-
    - Male
    - Female
    - Other
    - Prefer not to disclose

2. Which of the following age group you belong to?
    - 18-21
    - 22-25
    - 26-29
    - 30-35

3. Select the racial or ethnic group(s) with which you most identify (mark more than one if applicable)
    - White/Caucasian
    - Black/African American
    - Hispanic/Latino
    - American Indian/Alaska Native
    - Asian/ Asian American
    - Native Hawaiian/ Pacific Islanders
    - Others----------

Textile and Apparel Environmental Sustainability Knowledge (TAESK) Scale

Response options: True, False, I don't know

1. During the laundering process, synthetic fabrics shed microfibers which eventually make their way into water bodies and harm aquatic life (TRUE)
2. If residual toxic chemicals from textile processing mix with river water, they eventually end up in the food chain and pose a substantial health risk for humans and other animals (TRUE)
3. Nylon and polyester are environmentally friendly because they contribute substantially less greenhouse gas emissions than other fibers during production (FALSE)
4. The average American throws away about 80 pounds of used clothing per year (TRUE)
5. Roughly 8,000 different chemicals are used in textile production processes, most of them pose no health risk to human or animals (FALSE)
6. It is very difficult to recycle the wastewater created by textile and apparel dyeing and finishing processes (TRUE)
7. Approximately 17-20% of global water pollution comes from textile dyeing and finishing processes (TRUE)
8. Producing and caring for a pair of denim pants contributes the same amount of greenhouse gas emissions as an average car driven for approximately 80 miles (TRUE)
9. The global clothing industry distributes products around the world without producing harmful levels of carbon emissions. (FALSE)
10. Natural fibers, such as cotton and linen, takes approximately a hundred years to biodegrade (FALSE)
11. During the decomposition process of clothing items in a landfill, harmful chemicals, such as methane and carbon dioxide, are produced (True)
12. Cotton cultivation uses a minimal amount of water and does not pose much threat to global freshwater resources (FALSE)

Appendix B - Posttest Questionnaire

Textile and Apparel Environmental Sustainability Knowledge (TAESK) Scale

Response options: True, False, I don't know

1. During the laundering process, synthetic fabrics shed microfibers which eventually make their way into water bodies and harm aquatic life (TRUE)
2. If residual toxic chemicals from textile processing mix with river water, they eventually end up in the food chain and pose a substantial health risk for humans and other animals (TRUE)
3. Nylon and polyester are environmentally friendly because they contribute substantially less greenhouse gas emissions than other fibers during production (FALSE)
4. The average American throws away about 80 pounds of used clothing per year (TRUE)
5. Roughly 8,000 different chemicals are used in textile production processes, most of them pose no health risk to human or animals (FALSE)
6. It is very difficult to recycle the wastewater created by textile and apparel dyeing and finishing processes (TRUE)
7. Approximately 17-20% of global water pollution comes from textile dyeing and finishing processes (TRUE)
8. Producing and caring for a pair of denim pants contributes the same amount of greenhouse gas emissions as an average car driven for approximately 80 miles (TRUE)
9. The global clothing industry distributes products around the world without producing harmful levels of carbon emissions. (FALSE)
10. Natural fibers, such as cotton and linen, takes approximately a hundred years to biodegrade (FALSE)
11. During the decomposition process of clothing items in a landfill, harmful chemicals, such as methane and carbon dioxide, are produced (True)
12. Cotton cultivation uses a minimal amount of water and does not pose much threat to global freshwater resources (FALSE)

Open-ended questions

Knowledge related

Response options: Yes, No

1. Did you explore additional information about the environmental impact of textile and apparel industry beyond the postings on the Facebook over the last two weeks?
2. Did participation in this Facebook experiment changed your perception of textile and apparel industry?
3. Did participation changed your perception regarding consumers' responsibility and their use of clothing?

Attitude related

4. How did the information make you think about your responsibility for reducing the environmental impact of clothing?

   ---

5. How might this new understanding impact your clothing purchases and use,

   If any, how?

   If not, why?

   ---

6. From your perspective, how should the textile and apparel industry take responsibility for protecting the environment?

Appendix C - Recruiting Invitation Email

Subject line: Need research participants for social media experiment

Dear_____

Good morning! I need your help! I am a graduate student in the Department of Apparel, Textiles and Interior Design (ATID) at Kansas State University. As part of my master's requirement, I am completing an experimental research study. I am interested in the influence and impact of social media on users. In order to conduct the research, I need individuals willing to participate in a two-week social media experiment, where they will visit and engage with a Facebook page providing information related to the textiles and apparel industry. These individuals must have the following characteristics to qualify as participants-

1. Be a US citizen;
2. Be within the age range of 18-34 years;
3. Have Facebook account and willing to actively participate during the two-week period

The research has been approved by Institutional Review Board (IRB) at K-State. After completing the experiment, participants will be offered $30 gift card as a token of appreciation for volunteering. Please consider participating in my thesis research. If you are interested, please reply to this message for further instructions.

Furthermore, I am looking for additional participants and hope you can recommend others for participation. If so, please forward this message to acquaintances meeting above qualifications.

Appendix D - Experimental Facebook Page

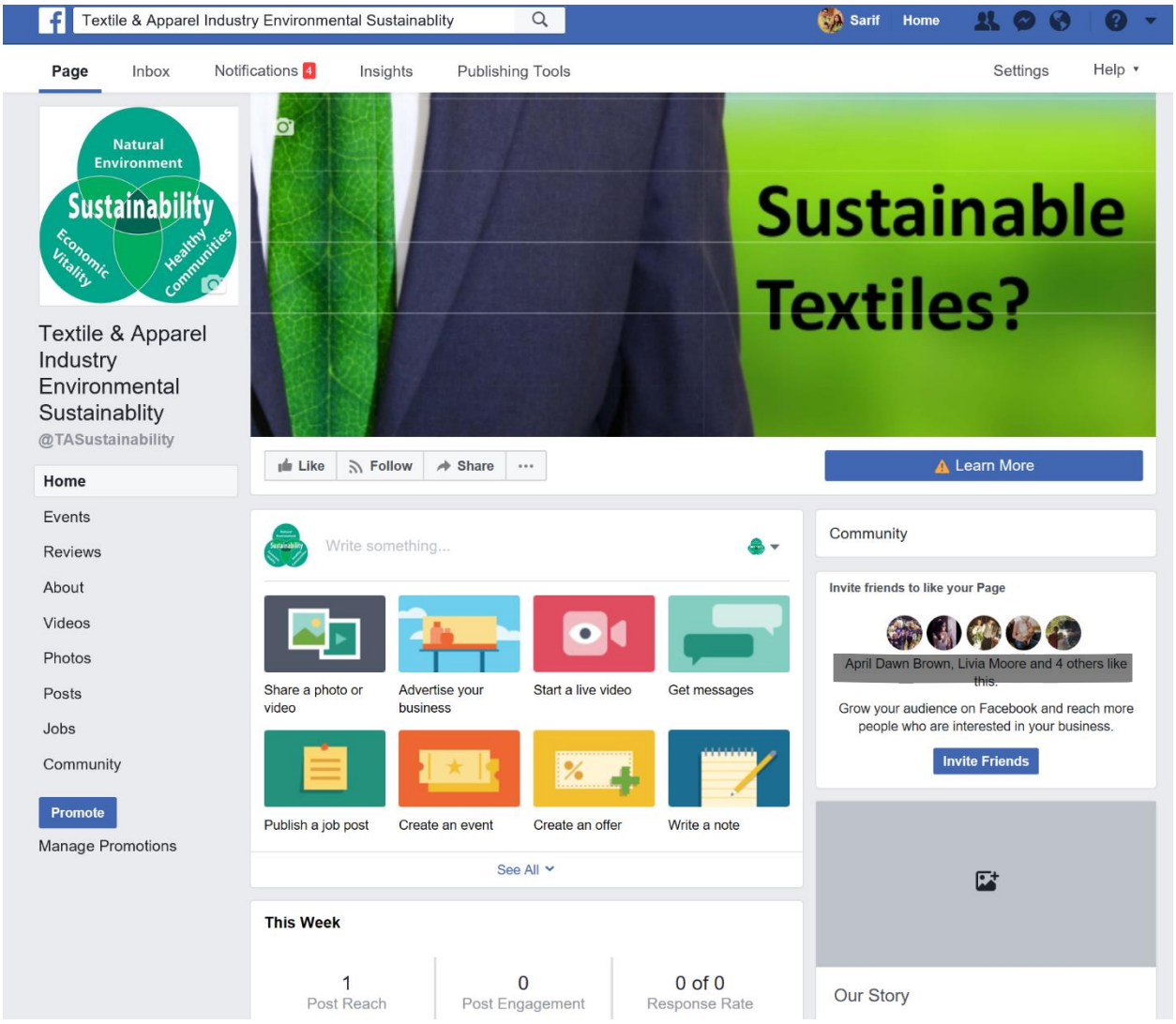

Figure D.1 The Facebook Page Used in the Study

Table D.1 Schedule of Content Postings on Facebook

1st week			Posting time	2nd week			Posting time
Saturday	Water	Video	12:00-1:00 pm	Saturday	Chemical	Video	12:00-1:00 pm
	Water	Infographic	5:00-6:00 pm		Chemical	Infographic	5:00-6:00 pm
	Water	Web link	8:00-9:00 pm		Chemical	Web link	8:00-9:00 pm
Sunday	Energy	Video	12:00-1:00 pm	Sunday	Waste	Video	12:00-1:00 pm
	Energy	Infographic	5:00-6:00 pm		Waste	Infographic	5:00-6:00 pm
	Energy	Web link	8:00-9:00 pm		Waste	Web link	8:00-9:00 pm
Tuesday	Chemical	Video	12:00-1:00 pm	Tuesday	Water	Video	12:00-1:00 pm
	Chemical	Infographic	5:00-6:00 pm		Water	Infographic	5:00-6:00 pm
	Chemical	Web link	8:00-9:00 pm		Water	Web link	8:00-9:00 pm
Wednesday	Waste	Video	12:00-1:00 pm	Wednesday	Energy	Video	12:00-1:00 pm
	Waste	Infographic	5:00-6:00 pm		Energy	Infographic	5:00-6:00 pm
	Waste	Web link	8:00-9:00 pm		Energy	Web link	8:00-9:00 pm
Thursday	Water	Video	12:00-1:00 pm	Thursday	Chemical	Video	12:00-1:00 pm
	Water	Infographic	5:00-6:00 pm		Chemical	Infographic	5:00-6:00 pm
	Water	Web link	8:00-9:00 pm		Chemical	Web link	8:00-9:00 pm
Friday	Energy	Video	12:00-1:00 pm	Friday	Waste	Video	12:00-1:00 pm
	Energy	Infographic	5:00-6:00 pm		Waste	Infographic	5:00-6:00 pm
	Energy	Web link	8:00-9:00 pm		Waste	Web link	8:00-9:00 pm

Table D.2 Source of Water Related Content

Sl.	Title of the Source	Infographic source
1	Cotton is a very thirsty plant	http://www.fabricoftheworld.com/infographics/cotton-is-a-very-thirsty-plant/
2	Water consumption of a cotton vs polyester	https://stephenleahy.net/2014/10/07/sneak-peak-of-my-new-book-your-water-footprint/)
3	Water consumption of a pair of jeans	https://yourwaterfootprint.me/author/stephenleahy/
		Video source
1	Detox: Dirty Laundry background	https://www.youtube.com/watch?v=llpesURtaKs&index=1&list=PL6-7JyTp2U9_Q-SCoSfJhwrB-35tMZVsy
2	How Your T-Shirt Can Make a Difference	https://www.youtube.com/watch?v=xEExMcjSkwA&feature=youtu.be
3	The Truth Behind the Clothing Industry's Water Footprint & What You Can Do About It	https://www.youtube.com/watch?v=XO63YMmi0_8&index=14&list=LLhvdeaYbcYoPiMqRGLhtf4g&t=66s
		Web link source
1	Water wastage and contamination caused by irresponsible fabric dyeing process	http://www.fabricoftheworld.com/water-wastage-contamination-in-textile-dyeing/
2	Fashion: the thirsty industry	http://goodonyou.eco/fashion-and-water-the-thirsty-industry/
3	Aral Sea eco disaster: how textiles made a sea turn to sand	http://www.fabricoftheworld.com/aral-sea-disaster/

Table D.3 Source of Chemical Related Content

Sl.	Title of the Source	Infographic source
1	Fabric dyeing = death of water bodies	http://www.fabricoftheworld.com/infographics/fabric-dying-death-of-water-bodies/
2	Chemicals involved in the textile production process	http://www.fabricoftheworld.com/infographics/800-chemicals/
3	Clothing and global toxic cycle	http://www.greenpeace.org/international/Global/international/artwork/toxics/2011/detox/images/clothing-toxic-cycle.jpg
		Video source
1	Detox: How People Power is Cleaning Up Fashion	https://www.youtube.com/watch?v=uZucclsuKaU
2	Textiles: Environmental Impacts (Preview)	https://www.youtube.com/watch?v=NXTIfcfzSnE&list=PLuBFYz4XFs5MZOPKmUSQzfLob0MQRNcAs
3	What Are Synthetic Fibers? Why You Should Avoid Them.	https://www.youtube.com/watch?v=W-V1GH4Gt2I

		Web link source
1	Noyyal and Bandi rivers: shocking causes of the textile industry's pollution in India	http://www.fabricoftheworld.com/noyyal-river-and-bandi-river/
2	Killer fashion: textile microfibers kill marine life	http://www.fabricoftheworld.com/killer-fashion/
3	Come clean with your laundry: what you don't know may be hurting you	http://www.fabricoftheworld.com/come-clean-with-your-laundry/

Table D.4 Source of Energy Related Content

Sl.	**Title of the Source**	**Infographic source**
1	The truth behind your favorite pair of denim	http://stitchdiary.com/the-dirty-truth-behind-your-favorite-pair-of-denim/
2	The carbon footprint of clothing	http://visual.ly/carbon-footprint-clothing
3	8 common clothing materials and their eco-footprints	https://wunderlabel.com/blog/clothing-materials-eco-footprints
		Video source
1	The Impact of Your Clothes	https://www.youtube.com/watch?v=LlhgJwPDgrE&index=49&list=LLhvdeaYbcYoPiMqRGLhtf4g
2	Turn your closet GREEN	https://www.youtube.com/watch?v=y8IylbViO3Q&index=33&list=LLhvdeaYbcYoPiMqRGLhtf4g
3	The Environmental Impact of Fast Fashion	https://www.youtube.com/watch?v=JrzLsoNzWCQ&index=67&list=LLhvdeaYbcYoPiMqRGLhtf4g
		Web link source
1	Fashion on a toxic trip: just how far do your clothes travel to reach you	http://www.fabricoftheworld.com/fashion-on-a-toxic-trip/
2	Carbon footprint of the textile industry	http://www.domain-b.com/environment/20090403_carbon_footprint.html
3	Examining the textile carbon footprint	http://www.brighthub.com/environment/green-living/articles/73624.aspx

Table D.5 Source of Waste Related Content

Sl.	Title of the Source	Infographic source
1	Where do our old garments go	http://www.fabricoftheworld.com/infographics/where-do-our-old-garments-go/
2	The fact about textile waste	http://www.weardonaterecycle.org/about/issue.html
3	Mind your waste	http://www.usagain.com/mind-your-waste-infographic
		Video source
1	The True Cost of Fast-Fashion	https://www.youtube.com/watch?v=aWP2pRdcZdw&list=LLhvdeaYbcYoPiMqRGLhtf4g&index=40
2	Where do our old garments go	https://vimeo.com/182527588
3	Why your $8 shirt is a huge problem	https://www.youtube.com/watch?v=8_oY-5hpt3Q&index=29&list=LLhvdeaYbcYoPiMqRGLhtf4g
		Web link source
1	Colossal environmental damage caused by discarded fabrics	http://www.fabricoftheworld.com/environmental-damage/
2	Material rebellion	https://www.materialrebellion.com/mission/
3	Textile recycling facts and fig	https://www.thebalance.com/textile-recycling-facts-and-figures-2878122

Appendix E - Example of Regression Data Set

Table E.1 Example of Obtaining Mean Engagement Score for Video Format

Email	First Name	Last Name	FVideo_ Avg	FVideo1	FVideo2	FVideo3	FVideo4	FVideo5	FVideo6	FVideo7	FVideo8	FVideo9	FVideo10	FVideo11	FVideo12
Sub-1	Names are not provided here due to participants' privacy concern		0.92	1	1	1	1	1	1	1	1	1	1	1	0
Sub-2			0.00	0	0	0	0	0	0	0	0	0	0	0	0
Sub-3			1.00	1	1	1	1	1	1	1	1	1	1	1	1
Sub-4			1.00	2	1	2	1	0	1	1	1	1	0	1	1
Sub-5			0.25	1	1	0	0	0	0	0	1	0	0	0	0

Table E.2 Example of Obtaining Mean Engagement Score for Water Content

Email	First Name	Last Name	Cwater_Avg	CWater1	CWater2	CWater3	CWater4	CWater5	CWater6	CWater7	CWater8	CWater9
Sub-1	Names are not provided here due to participants' privacy concern		1.00	1	1	1	1	1	1	1	1	1
Sub-2			0.00	0	0	0	0	0	0	0	0	0
Sub-3			1.00	1	1	1	1	1	1	1	1	1
Sub-4			0.89	2	1	1	0	1	1	0	1	1
Sub-5			0.78	1	0	2	0	1	2	0	1	0

Appendix F - Facebook Comments/Replies of the Participants

Table F.1 Facebook Comments/Replies of the Participants

Subjects	Knowledge Gain	Water	Energy	Chemical	Waste
01	10	N/C	"52 micro seasons" that's a lot	"wow, interesting read"	N/C
02	10	"sometimes stuff like this almost feels pointless because the common person may want this to change, but how could we ever get big companies to change" "I like the list at the end- it was helpful. But, if feels like no matter what we do we're wasting water and leaving a carbon footprint and damaging our world and it's frustrating"	"This makes me want to at least start hang drying my clothes. I've never really thought about what washing and drying my clothes does"	"Would hand washing and hang drying make anything better?" "Where is the 'what can be done' portion?	I wish more people I knew recycled their clothing and I wish there were more ways and places to recycle textiles" "Where do I take my clothes to recycle?"
03	8	N/C	"Surprising to think about the amount of water we could conserve from one less pair of jeans made"	N/C	N/C
04	8	N/C	N/C	N/C	N/C
05	7	"Very Interesting. It leaves me with many questions. Are there ways to produce textiles without creating toxins? How can we get other countries or at least American companies in other countries to deal with the toxins in a safe way"? "This comes after agriculture as if agriculture was wasting	N/C	N/C	"I agree. I also think the textile industry could help out more by making clothes the last longer and which aren't see through to begin with"

		the water. Food is fairly important, and irrigation prevents tragedies like the Dust Bowl. From my understanding, the water used in cotton production and washing clothes can be cleaned and reused with little difficulty" "I would definitely get on board with proposed solutions. If there is a better way to do things, or if It could be researched, that would be fantastic" "This one left me confused. It is really unspecific about possible alternatives to the things it's suggesting we eliminate" "That's really surprising. I would have thought it would have been the other way around"			
06	7	"Long time Nike fan but I sure hope they are starting to take different measures to clean up their processes since the release of this video" "It makes me wonder why the clothing industry hasn't found a more efficient/less wasteful product to use than cotton" "It's pretty neat they were able to find an alternative to cotton,	"I am a big fan of good fitting pair of jeans and it's too bad that the processes behind making denim is harmful"	"I've always found this to be highly alarming. It makes you wonder what marine life could be without all the pollution"	"I definitely had a conversation with someone about this the other day and it amazes me the amount of waste that is produced just around the fashion/clothing industry"

		even though it didn't have the same traits as cotton"			
07	7	N/C	N/C	N/C	N/C
08	6	N/C	N/C	N/C	N/C
09	6	N/C	N/C	N/C	"Would shopping our own thrift stores before going to a new store help this problem at all? Or just wearing what we have?
10	6	N/C	N/C	N/C	N/C
11	6	N/C	N/C	N/C	N/C
12	6	"I never knew this, especially about Nike and H&M!"			"Does Manhattan have a textile recycling center?"
13	6	N/C	"I never would have thought that the fashion industry contributes to pollution, especially on par with energy pollution..."	N/C	N/C
14	6				
15	6	"The negative side effects were horrible and obviously not taken into enough consideration"	"I didn't know that! I hope there are ways to create jeans with less of an impact on the environment. I really hate though that the video does not explain how or which part of the process of making jeans creates the CO2" "I didn't realize that clothing is the second most polluting thing next to oil"	"I would love to know more about which companies use safe methods for making clothes!"	"More people need to care about recycling and donated their clothes"
16	5	"That is surprising! I sincerely hope that since 2011 these companies have taken responsibilities over their supply chains"	"I agree that the production process should be looked at deeper as well as counteracting the carbon production by bettering the environment"	"Very interesting, it's especially disturbing about the risks to the factory workers"	"I am also interested in the answer to that question!" (reply) "I would also like to know what options there are for recycling clothes rather than

	“Wow! I think the most impactful statistics for me was the fact that the water required for 1 cotton t-shirt is equivalent to 1 person’s drinking water for 3 years” “I agree that the solutions to this problem should be investigated! I think to make it happen there needs to be more pressure from social awareness or regulatory bodies, sadly while being more environmentally responsible is a great goal, I would imagine that if there are not strong financial incentives for producers to change, it won't happen” “I agree, Katie, also, the fact that at almost every give-away type of event the prize is a t-shirt is the reason at least I have so many to begin with. I really don't need a t-shirt for event I've ever gone to. How do we recycle them??” “Interesting! I didn't know polyester was less water-intensive to produce” “I was a little bummed to hear it took them 3 years to get enough flax to make 1 garment, but good of them to spread awareness!”	“The products advertised are interesting, it is a standard best practice in many industries to use similar tools to make buying decisions. Interesting that the textile industry appears to be behind the curve” “I agree! It sounds like we should be less quick to buy new clothes!” “ I agree that this infographic was a little harder to follow” “I hadn't thought about the impact of over-washing/drying either!” “That was an interesting infographic! I wonder what would happen if consumers saw this at the store before they bought clothing”	"upcycling" them, especially things that have holes, etc.”

17	4	N/C	“I don't want to buy clothes anymore”	N/C	N/C
18	4				
19	4	N/C	“I was thinking the same thing. It's crazy that shipping costs are still lower than creating the fabric in the US.” (reply) “It's good to be reminded that we have some power in what sells and what doesn't. This is up to us, too.”	“The world is so broken. This just reminds me of it. Everything is so systemic, that there aren't easy solutions anymore”	“4% of the Earth is a big deal. That stresses me out.” “Glad things can be recycled though! There is so hope. Maybe with more education, things can change” (reply)
20	4	“Gross! I didn't know that!!	N/C	N/C	“I had no idea there was so much waste in clothing!!”
21	4	“Definitely something to think about. It's hard to associate the shirt on my back as being from anywhere other than the clothing rack I pulled it off of, but there's a whole line of people and communities along the way that it's production may have harmed” “I have to agree with Aidan on this one - cotton, like all crops surely uses a lot of water, plants are living things. I think the issue here could be that the cotton farms need more sustainable ag techniques to reuse water and cut down such extreme measures to grow cotton plants. I am definitely interested in recycling cotton - is that a	“It's hard to imagine how much cargo those massive ships can carry across the ocean, making it, while not incredibly fast, very cheap per pound. The issue this brings though is cargo ships are some of the most inefficient (fuel wise) and polluting modes of shipping. A good solution is to only buy products that are completely sourced from nearby countries, but the cost rises exponentially. It's a matter for us consumers: lower prices, or environmentally friendly?” (reply) “This is probably my favorite video so far, she explains the negatives of fast fashions in an accessible way and then offers	“It seems like the pattern is coming up, again and again: short term savings with horrible, long-term ramifications. Will we as consumers buckle down and pay that higher price tag for properly ran textile factories? And if we are, what are our options?”	N/C

		viable practice, who does it (locally) and would it significantly reduce the need for cotton growers?" "Does a public mind set need to shift to accepting dyes that don't give us a wide gamut of color options, but are better for the environment?" "Alternatives to cotton? Is wool/ polyester/ etc. any better?"	direct ways to combat them. This is the video people need to see!" "Probably one of my favorite infographics thus far, but I do have an issue: why is there such a big time to maturity difference between organic and regular cotton? Why doesn't linen have a maturity time?"		
22	4	N/C	"How could this process or fabric be more environmentally friendly?"	N/C	"Quality over quantity, always!" "I know some clothing recycling centers are scams in that they turn around and re-sell you items. Any info on "legit" recycling centers?
23	4	"Does China have pollution laws in place and the factories ignore them or are there just no laws at all?" "Is it absolutely necessary to use that much water in the process of making the clothing?"	"If companies convert to greener methods will that increase the price of jeans/denim?" "	"Also why aren't there better laws and regulations put in place to prevent the discharging of contaminated/polluted water? Do these companies not have repercussions for what there are doing or just simply do not care?" "What about the conditions that the workers have? Are they ingesting chemicals from the dyes and polluted water?"	"Where can you take old clothes to be recycled? Like clothes that have rips, stains, etc.?" "What happens when you donate clothes and they throw them away because they didn't sell? Where can we take clothes to be recycled and how does that process work?"

24	3	N/C	N/C	“How can we help developing countries reduce their dye pollution when they often rely on their inexpensive clothing manufacturing supplies/methods for economic development and competitive advantage?”	N/C
25	3	“I had no idea this was an issue!” “Those facts about water usage are alarming. However, I wasn't sure what the message of this video was. My takeaway was to try to wash your clothes less often and not buy cotton materials??” “That's crazy. Unbelievable to think almost every item of clothing I own has cotton in it, with the majority of them being 100% cotton” “I valued the tips at the end of the article as to how to increase the lifespan of your clothing items. Still shocked at the fact about polyester fibers being released into the water system every wash, especially when that is supposed to be a less water costly alternative to cotton as well.” “The amount of garments purchased per year is alarming”	“I'm curious as to why this is only the case for denim” “Most jeans are made of more than just cotton, so does that have additional wastes of water and carbon emission too?” “Fast fashion is not only harmful, but so frustrating as there are new trends every month and by the time you convince yourself to buy into the trend it's already out of style anyways.” “I didn't exactly understand this visual, besides the comparison of different fabrics.”	“Is it simply the dyes in clothing that is causing this pollution in water or is it air pollution from textile factories as well?” “I'm not sure how recycling the water used in dyeing garments would not be harmful in other ways as well. I feel like it would have to be treated by yet another chemical to rid it of its color, that'd be interesting to learn about.” “Interesting to learn about the process of how fibers become clothing, but taken aback by the massive number of chemicals used. That's crazy!”	“What can you do with the clothes that can't be donated or recycled, such as undergarments and tarnished clothes?” “Good information to know! Fast fashion is overall not a good thing” “I've never seen a textile recycling container at any convenience store or even a clothing store” “The comparison of the 4% of the earth's surface is textile waste to Australia was a good visual for me”
26	3	‘That's so sad” “Wow I had no idea!”	“Wow crazy!!”	“That poor river” “SO sad 😢”	“Trying real hard lately to research better brands that treat employees fairly”

		“I think a lot of people buy way more than the 27 items too!”	“There are plenty of clothes in the world at the moment! We could probably stop making them for ten years and be totally fine trading around what already exits”		“I shop mostly at thrift stores which is kind of like recycling!” “I try to always give clothes away to friends and donate them and only throw things away if they're totally trashed and ripped”
27	2	N/C	N/C	N/C	N/C
28	2	N/C	N/C	N/C	N/C
29	2	“Wow, I never would have thought it takes so much water. I like to be eco-friendly, but I don't like polyester. That's a good reason to shop at thrift stores :-)”	N/C	N/C	N/C
30	2	“What facilities recycled cotton clothing?”	“What are operationalizable steps that informed citizens can take to address this?” “is there a consensus as to whether the net harm caused by cotton garments is more or less than synthetics?” “Can they provide citations for the studies?”		“I have been told it is very difficult to recycle most clothing because it is made of mixed fibers. Is that true?” “Again, please explain how and where to recycle clothing?” “It is frustrating that there is not enough information about how to recycle unusable garments” “Please provide information about how to actually do this”
31	2	N/C	N/C	N/C	“I agree with everyone's questions...more resources on solutions. I also know "donations" from America are sent around the world and often

					sold to other people or fill their landfills also...how do we know who is reputable?" "The section on what we can do is such a very little portion of this article. I feel like there needs to be more resources that people can take action on...links to info on recycling clothes for example. I would gladly do that but where? How? Reputable places?"
32	2	"New Balance is one of the only major shoe brands made in the US, they seem to be a little more environmentally friendly"	N/C	N/C	N/C
33	1	" Makes me think about where I'm buying clothes from"	N/C	"Yeah I was thinking that too! I was also wondering how much waste the fashion industry produces compared to other industries" (reply)	"I didn't ever realize how our clothes affect Africa's job industry"
34	1	"This is eye-opening, I did know all of this about Nike especially but tried to block it out of my head I guess & still purchase their gear" "This is eye opening and just kind of scary. Seems kind of hopeless" "Next article you posted "Fashion and Water" describes the harm of polyester in washing machine leaves reader a little confused when combined with this article promoting polyester"	" The amount of clothes ending up in the landfill due to people's desire to only wear a certain outfit once is outrageous"	"This is so frustrating!"	" I like the infographic, easy to follow"

		"Good reminder to be conscientious and strategic about washing clothes" "Glad to hear there are intuitive people out there creating solutions" "I had no idea"			
35	1	N/C	N/C	N/C	N/C
36	1	"I didn't know cotton required that much water to grow"	"I find it hard to believe it is cheaper to ship something around the world twice to avoid higher labor costs. Are labor costs in other countries really so low that it makes financial sense to do business that way?" "I didn't realize so many heavy metals were involved in the process.	"Is there a way to use natural dyes from plants instead of chemicals? Or are they more expensive or don't last as long?"	N/C
37	1	"Wow this really makes me think about what kind of clothes I'm buying!" "I thought this could be an issue, but I didn't know it was so big!" "I heard once that cotton took a lot of water, but I haven't really thought about it much since. The disparities between the two are crazy!"	"This post really affected me the most. So sad!"	"Seeing the purple water from the hazardous chemicals made me want to throw up/cry. How is this not a more vocalized issue?!" "I had the same questions as Haley. Why are there not repercussions for these companies?"	"Wow! This was eye-opening to how wasteful we are" "I want to start recycling my clothes, but where can I do that?" "I wish there was more information out there about textile recycling!"
38	1	N/C	N/C	N/C	N/C

39	1	N/C	N/C	N/C	N/C
40	1	N/C	N/C	N/C	N/C
41	0	“It's so hard to watch this in a time where everyone is so concerned about the environment and the toxins they're putting in/on their bodies” “Now I'm glad that I rarely buy clothes and wear lots of hand-me-downs. I knew that agriculture used a lot of our water resources, but I had no clue how much water we also took to produce a shirt. “Once again, social norms are part of this problem. Ppl judge you if you only wear a couple of shirts or rewear items before washing them. At home I air dry most of my stuff when I can. College I have to dry stuff because of space, but when I can I air dry”	“same” (reply) “So earlier we were annoyed at cotton, but in this chart it looks like one of the better options?	“People don't like the colors because they think they look faded or aren't always the shades we want. And some colors just can't be produced through natural (I think?) (reply) “ Same” (reply) “This happens in a lot of industries and I dislike it” “Look at the long term dang it!” “I wonder what people would do if the consumers had to face the consequences of the industry. What if we moved production to the developed countries? I bet that might do something”	“You have to wonder what is considered waste. Some clothing can't be recycled or donated even if it is in fine condition which is wasteful. But sometimes an item is damaged to the extent that it is no longer useful (like if the entire sock has become a hole). Do those count as waste too?”
42	0	N/C	N/C	“This video is 4 years old. I wonder how much has changed since then. Anything? More companies choosing non toxicity?”	N/C
43	-1				
44	-1	N/C	“Hm. I wonder how much switching to "green" or "eco-friendly" labeled products both by companies and consumers will actually decrease waste” “Super interesting! I read a book by Yvon Chouinard who	“My biggest problem with most all of these: how do we avoid it? As someone who is environmentally and health oriented, I've found almost no solutions, even the "eco-friendly" or "organic" chemicals still are damaging”	N/C

			also discusses how even in buying "green" or "organic" does not mean they leave no carbon footprint due to shipping of products for assembly then to the consumer”	“I haven't! I'll check it out!!! (reply)”	
45	-2	“That's a lot of water!”	“Didn't realize the carbon footprint of a t-shirt could be so high”	N/C	N/C
46	-3	N/C	N/C	N/C	N/C