

AN ABSTRACT OF THE DISSERTATION OF

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Title: Sustainable Apparel Consumption: Scale Development and Validation

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Abstract

The purpose of this project was to develop a scale to measure sustainable apparel consumption. This study used concept analysis to identify attributes of sustainable apparel consumption. Within an academic online database, a search for articles containing “sustainable consumption” in their titles was performed. Within each article, the attributes associated with sustainable consumption were identified. Based on the attributes found, The researcher developed an initial sustainable apparel consumption measurement scale, and then conducted a series of quantitative tests to examine its reliability and validity. The findings of this study resulted in 11 sustainable apparel consumption (SAC) scales and generalizable to both those who and those who do not practice sustainable consumption. The SAC scales created an overall standard of sustainable consumption in apparel by including the three main stages of consumption, pre-acquisition, acquisition and post-acquisition, and three principles of sustainability, social responsible behaviors and environmentally oriented behaviors. The

results showed statistically acceptable internal reliability and validity. The major contributions of this group of scales are to clarify the behaviors associated with sustainable apparel consumption and consequently to provide a measurement scale foundation for future research. The 11 scales represent 11 behavioral dimensions within consumption which should be used separately to investigate consumers' consumption behaviors including consumers' need recognition; consumption behaviors towards products' environmental impact, e.g., whether consumers will purchase an apparel made from organic and recycled materials; consumption behaviors towards products' social impact, e.g., whether consumers will purchase an apparel made from ethical manufactures and retailers; consumption behaviors towards perceived manufacture and retailers environmental and social commitment, e.g., the degree to which consumers prefer to purchase apparel linked to manufacturers and retailers who are identified with environmental and social causes; point of purchase behavior, e.g., whether consumers will buy second-hand clothes; continued use, e.g., whether consumers will continue to wear an item which is damaged ; repurpose behavior, e.g., whether consumers will repurpose an item which is damaged; alteration for maintenance, e.g., whether consumers will alter an item which is not fit; use of eco-cleaning processes, e.g., whether consumers use eco-friendly detergent; and divestment behavior (give it away), e.g., whether consumers will donate their unwanted clothes.

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Sustainable Apparel Consumption: Scale Development and Validation

by  
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I understand that my dissertation will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my dissertation to any reader upon request.

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Ruirui Zhang, Author

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## CHAPTER 1--INTRODUCTION

### 1.1 Overview

Sustainable consumption refers to the “use of services and related products which meet people’s basic needs and bring a better quality of life but also with the purposes of minimizing the use of natural resources and toxic materials, as well as minimizing waste and pollution emissions over the life-cycle of the service or product so as not to jeopardize the needs of future generations” (UNCSD, 1994). However, this concept has been interpreted and used in different ways (macro-level perspective supply side and micro-level perspective demand side) and areas (ecology, macroeconomics, environmental policy and ecological economics), including sustainable consumption in natural resources (Heap, Kent, & Klug, 2000; Spaargaren, 2003), sustainable consumption in product life-cycle and supply chain (Hertwich, 2005), sustainable consumption in behavioral economics (Evans & Jackson, 2008; Kelandai-Matchett, 2009), sustainable consumption of personal life-style (Gilg, Barr, & Ford, 2004; Mont, 2004; Vermeir & Verberke, 2006), and sustainable consumption in consumers’ decision making process (Hertwich, 2005; Kelandai-Matchett, 2009). However, only a limited number of researchers have provided specific valid empirical references and operational definitions that can be used to measure consumers’ sustainable consumption of apparel.

Indeed, at a more discrete level, what constitutes “sustainable apparel consumption is truly discipline-dependent; therefore, unique empirical referents specific to sustainable consumption attributes within the context of apparel consumption should be developed. For example, within the evaluation of alternatives phase of decision making, what specific criteria might a consumer consider when they are evaluating the environmental impact of an

apparel product? To move towards developing a list of specific criteria, industry specific models such as the Higg Index 1.0 and the SMART© Sustainable Textile Standard should be reviewed. The researcher of this study believes that there is a need to develop a framework for identifying, from a micro-level perspective, whether an individual is practicing sustainable consumption of apparel products. Sustainable apparel consumption is associated with several different attributes /aspects within the behaviors of buying and consuming apparel product. Consumers can practice some or all attributes/aspects of consumption in their daily lives to achieve sustainability.

Within the context of the Engel, Kollat, and Blackwell's (EKB) purchase decision model, one can consider different sustainable consumption attributes as they relate to consumer need/want recognition, information search, pre-purchase evaluation of alternatives, and purchase (Engel, Blackwell, & Miniard, 1990). For example, at the need recognition phase, attributes such as deciding that an identified need/want does not truly require fulfillment may come into play. At the evaluation of the alternative phase, evaluating products based on ecological impact (resources, energy, pollution, waste), eco-labels, locale of production, product life-cycle, and product longevity (quality, long-term fashionability) may come into play, as well as a willingness to pay for the environmental cost associated with the product and the consideration of alternatives to purchasing a product, such as sharing or renting an apparel product. At the purchase phase, ultimately purchasing a product based on any of the above criteria, or purchasing a service such as garment repair to fulfill a need rather than purchasing a new product might come into play. In addition to the purchase decision making process, post-purchase behavior, including use and post-use must also be considered (Belz et al., 2009). At the use stage, a consumer may engage in strategies

to reduce the environmental impact of laundering or to maintain product longevity, whereas at the post-use phase, a consumer may engage in responsible product disposal, recycling, and re-use.

## **1.2 Statement of Purpose and Objectives**

The ultimate objective of this study was to develop a valid instrument to measure sustainable apparel consumption. Such a scale would allow researchers to investigate the specific ways in which consumers are or are not practicing sustainable apparel consumption. Scholars or educators could use the scale to identify areas where consumers could improve in regard to sustainable consumption and adjust educational programs to aid in such an evolution. Two stages were followed in development of the scale. In the first stage, the researcher reviewed key literature to address the first three research questions that relate to defining the concepts of apparel consumption, sustainable apparel products, and sustainable apparel consumption. In the first step, a review of literature was performed to define apparel consumption. In the second step, a review of literature was performed to identify attributes of sustainable apparel products. In the third step, a concept analysis was performed to identify the attributes of sustainable consumption; this enabled the researcher to specify the domain and dimensionality of the concept and generate a sample of scale items. Additionally, This enabled the development of an operational definition of sustainable apparel consumption and was used as a guide to identify and develop items to be included in the initial scale.

In the second stage, the researcher further refined the proposed Sustainable Apparel Consumption Scale. This process entailed administering the proposed scale to a purposive sample and performing statistical data analysis (e.g., correlation, exploratory factor analysis,

confirmatory factor analysis) to examine the measurement scale for sustainable apparel consumption. During this stage, the researcher discovered that 11 scales, rather than one comprehensive scale, proved more effective in measuring sustainable apparel consumption. In addition, the researcher verified the reliability and validity of the 11 scales during the instrument development processes.

### **1.3 Research questions**

Sound research methodology requires that “sustainable consumption” must be conceptually and operationally defined; however, this is a daunting task. Seyfang (2006) contends that the precise definition of sustainable consumption is elusive and argues that there is a need to develop a framework for identifying whether an individual is practicing “sustainable consumption” of apparel products (Seyfang 2006). Furthermore, Winakor (1969) recognized that consumption behavior is product specific. In her study, she claimed that consumers’ clothing consumption includes different stages, including the pre-acquisition stage, the acquisition stage, and the post-acquisition stage, but specifically, usage, storage and disposal, and post-disposal evaluation. Therefore, the researchers will develop a scale to measure how consumers engage in sustainable apparel consumption behavior during each stage of apparel consumption.

To develop a Sustainable Apparel Consumption Scale, the following research questions were addressed:

Q1: How have prior researchers defined consumption and sustainable consumption?

Q2: What constitutes a sustainable apparel product?

Q3: What are the behaviors associated with sustainable apparel consumption?

#### 1.4. Definition of terms

Based upon the literature reviewed to answer the three research questions stated above, the following definitions were developed.

*Sustainable consumption* is defined as "the use of services and related products which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as emissions of waste and pollutants over the life-cycle of the service or product so as not to jeopardize the needs of future generations."(UNCSD, 1994). Sustainable consumption has some or all of the following attributes:

- Consuming products with less environmental impact.
- Consuming “green,” “eco-label,” fair trade environmental friendly products.
- Consuming fewer products.
- Using services rather than buying new product.
- Consuming locally produced products.
- Considering product life cycle in consumer decision making.
- Disposing of product responsibly.
- Considering the longevity and durability of a product in purchase decision making.
- Consuming reusable or recyclable products.
- Engaging in responsible and ethical consumer behavior.
- Including environmental concerns in the process of selection, purchase, use maintenance, repair and disposal of products.
- Being willing to pay for the environmental cost associated with product.

*Macro-level perspective of sustainable consumption* is centered on the supply-side of sustainable consumption. This includes how globalization leads to unsustainable



consumption patterns by applying unsustainable sourcing, production and supply chain patterns (Fuchs & Loreck, 2002), how governance mechanisms manipulate the policies to influence sustainable consumption and sustainable development in the society (Wolff & Schöneher, 2005), how ecological economics, such as the tools of the input-output model (IO) and life cycle assessment (LCA) examine sustainable consumption in production (Hertwich, 2005; Takase, Kondo, & Washizu, 2005), and how environmentally friendly technical innovations influence sustainable consumption, production and development (Spaargaren, 2003).

*Micro-level perspective of sustainable consumption* is centered on the demand side of consumption. Such research focuses on behavioral economics (consumer behavior and decision making), social psychology (people's thought, feelings and behaviors), personal lifestyle, micro-marketing (consumer and individual marketing), and education (Hertwich, 2005; Seyfang, 2007; Kletzan, Köppl, Kratena, Schieicher, & Wüger, 2002; Mont, 2004; Evans & Jackson, 2008; Haron, Palm, & Yahaya, 2005; Comim, Tsutsumi, & Varea, 2007; Gilg, Barr, & Ford, 2005; Vindigini, Janssen, & Jager, 2002; Vermeir & Verbeke, 2006).

*Consumption* is defined as when individuals select, purchase, use, or dispose of product, services, ideas, or experiences to satisfy needs and desires" (Solomon & Rabolt, 2004, p.23). Consumption includes four stages as follow:

- *Pre-acquisition behavior* is the pre-purchase process. Consumers are awakened by need recognition, are directed by information search and evaluation of alternatives, and engage in other types of mental activities (Boyd & McConocha, 1996).

- Acquisition behavior is an activity that happens between the buyer and seller when the actual purchasing or ordering decision has finally been made (Boyd & McConocha,1996).
- Post-acquisition behavior is when the consumer has ownership and physical possession of the item. Boyd and McConocha (1996) acknowledged that consumers' engage in a variety of activities during this process including usage, maintenance, and storage.
- Divestment behavior is disposition or disposal of the item. Harrel and McConocha (1992) described four disposition options for consumers including sell/swap, pass along, donate, and throw away.

*Sustainable apparel* should have some or all of the following attributes:

- Healthy and harmless to people and environment.
- Can be recycled and reused for other purposes.
- Have good quality, longevity and durability.
- Made from natural, bio-based materials and treated by using bio-based or natural procedures.
- The producing processes are ethical.
- The product-life-cycle, from the raw material and the product end-of-life, has minimal environmental impact (Weller & Walter, 2010; SMART © Sustainable Textile Standard 2.0, 2006; The Higg Index 1.0, 2012; Dickson, Loker, & Eckman, 2009; Fletcher, 2008; Hethorn & Ulasewicz, 2008).

*Sustainable apparel consumption* Sustainable consumption of apparel includes a variety of behaviors during the pre-acquisition, acquisition and post-acquisition stages of the consumption. Behaviors include the following:

- Looking for and using information regarding sustainable apparel attributes during the pre-acquisition stage.
- Buying apparel products, which have sustainable attributes during the acquisition stage.
- Continuing to wear or mending an apparel product that is damaged or looks worn during the post-acquisition stage
- Continuing to wear or altering an apparel product that does not fit during the post-acquisition stage
- Altering or continuing to wear an apparel item after it is no longer in fashion during the post-acquisition stage.
- Laundering an apparel item to preserve its condition and/or to conserve energy and water during the post-acquisition stage.
- purposing or disposing of an item in a way that prevents it from going into the garbage.

## **CHAPTER 2 --LITERATURE REVIEW**

The purpose of the present research was to develop a valid and reliable scale to measure sustainable apparel consumption. To frame the purpose of the project, the literature review first addresses perspectives of sustainable consumption on both macro and micro levels as well as showing how the present study fits within the micro level perspective. After framing the research project, the concept of “consumption” and the concept of “sustainable” are defined within the context of apparel. Clearly defining these concepts is important, as this will guide the researcher to further operationalize the concepts during scale development. In addition to defining concepts, another important aspect of scale development entails testing the scale for convergent and discriminant validity. Thus, existing related scales that can be used to perform such testing must be identified. Therefore, the literature review also presents information on relevant scales that can be used for such a purpose. The literature review concludes with an overview of theories to which a sustainable consumption scale could contribute.

### **2.1 Sustainable consumption from a macro-level versus a micro-level perspective**

The term “sustainable consumption” was introduced into the international policy arena in Agenda 21 of the United Nations Conference on Environment & Development, which was held in Rio de Janeiro, Brazil in 1992. This definition was further refined and presented in the 1994 Oslo Symposium by the United Nations Commission on Sustainable Development (UNCSD) as "the use of services and related products which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as emissions of waste and pollutants over the life-cycle of the service or product so as not to jeopardize the needs of future generations” (UNCSD, 1994).

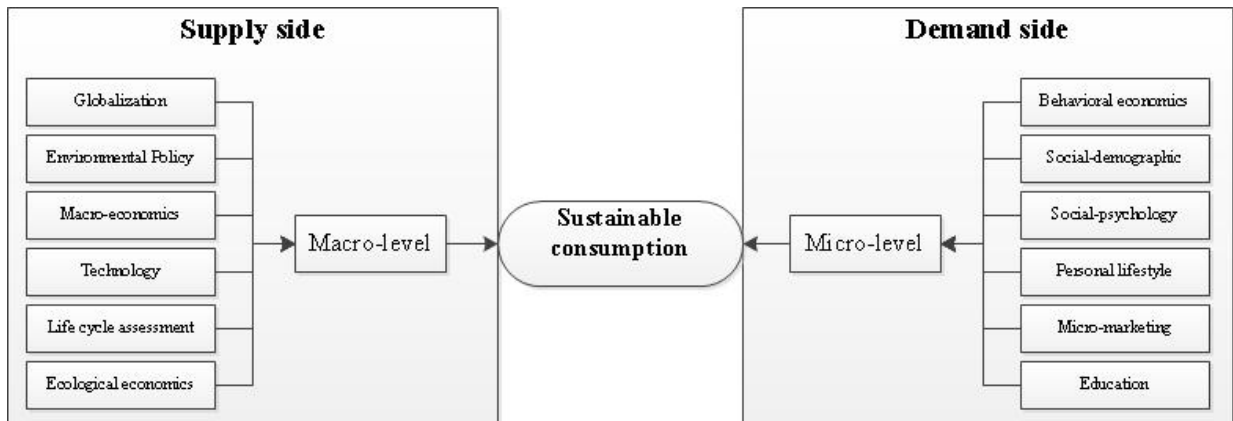
The United Nations Conference on Environment & Development (UNCED) in 1992 identified “the unsustainable pattern of consumption and production, particularly in industrialized countries” to be “a major cause of the continued degradation of the global environment.” The 2002 World Summit on Sustainable Development in Johannesburg, South Africa called for a comprehensive set of programs focusing on sustainable consumption and production. Twelve years have passed since the 2002 World Summit on Sustainable Development in Johannesburg, and sustainable consumption and production is still in the beginning stage of the development. The essence of the difficulty of the topic is that political, environmental, social and technological issues are all involved in it, and more time is needed to give answers or provide a perfect and practical solution for this topic (Fuchs & Lorek, 2002; Seyfang, 2007). Even now, sustainable consumption has become a core policy subject in national and international arenas in the United Nations Department of Economic and Social Affairs (UNDESA).

In the sustainable production and consumption related academic and political debates, two general approaches to explore this topic have been used: macro-level approaches/perspectives, and micro-level approaches/perspectives. From a macro-level perspective, sustainable consumption research investigates macro-economic collective behaviors, such as appropriate sourcing behaviors, supply chain decision-making, or corporate social responsibility, or macro-level environmental behaviors, such as the consumption of natural resources by corporations (Heap, Kent, & Klug, 2000; Spaargaren, 2003). A number of researchers analyzed sustainable consumption by using the following dimensions: political, technological, environmental, and macroeconomics dimensions, product life cycle assessment (LCA), the in-put and out-put model (IO), and continuous

exponential growth and distribution of wealth within and between countries (Fuch & Lorek, 2002; Hertwich, 2005; Kilbourne, McDonagh, & Prothero, 1997; Wolff & Schönherr, 2011). From a micro-level perspective, sustainable consumption research investigates individuals' consumption behaviors, such as consumer characteristics, consumer response to the environmental stimuli, and the consumer decision making processes (Hertwich, 2005; Seyfang, 2007).

Using either macro-level or micro-level perspectives (See figure 1.1) to frame their research, researchers have focused on identifying which element or elements can effectively motivate society as a whole to move toward sustainable development (Comim, Tsutsumi, & Varea, 2007; Kilbourne, McDonagh, & Prothero, 1997; Spaargaren, 2011).

A review of literature shows that the concept of sustainable consumption includes both macro- and micro-level dimensions. For example, Fuch and Lorek (2001) state that sustainable consumption can refer to two categories: supply-side sustainable consumption and demand-side sustainable consumption. In fact, Masera (2001) states that in order to distinguish the type of sustainable consumption, people need to clarify between consumption of resources such as materials and energy and consumption of products and services to meet current wants and needs. The perspective, either macro or micro, most appropriate to apply to one's research truly depends upon the research question under investigation.



*Figure 1.1.* The Macro versus Micro perspective on sustainable consumption

### **2.1.1 Macro-level Perspectives of Sustainable Consumption.**

Fuchs and Loreck (2002) focus on the macro-level and mention that globalization is the main parameter that altered the neo-classical consumption pattern. They pointed out that globalization affects determinates of unsustainable consumption patterns in this modern society. The world-wide economic pattern and the irresistible trend of technology advancement are increasing consumption choices among consumers. In addition, globalization has reshaped the world by not only changing the organization of production and its transaction format, but it has also influenced the characteristics of policy networks among the countries. Therefore, Fuchs and Loreck (2002) stated that the policy interventions to manipulate the relationships between globalization and localization are critical in the pursuit of sustainable consumption.

As mentioned above, globalization has not only reshaped the world's economic system, but has also changed today's politics and political reforms. If we look at sustainable consumption and production from macro-level perspectives, public and political support are indispensable, and the politicians and decision makers play a vital role in accelerating the speed of becoming a sustainable society. Indeed, some policies are created to put sustainable

consumption into practice more effectively. Those policies' outcomes are targeted to lead to some positive changes in the environment, economy, and society by changing consumer consumption patterns (Dolan, 2002; Kilbourne, McDonagh, & Prothero, 1997; Spaargaren, 2011; Wolff & Schönherr, 2011). However, changing consumer consumption patterns not only means changing individual or household consumption patterns, but also changing the consumption behaviors of institutions, corporations, and even countries. (Fuchs & Lorek, 2002). Therefore, formulating policies for sustainable consumption is a complex issue.

In order to achieve the goal of sustainable consumption, a number of macro-level research studies examined what policy instruments effectively render the consumption pattern in a sustainable direction. Kletzan, Köppl, Kratena, Schleicher and Wüger (2002) suggest that in sustainable consumption policy, not only economic factors, but micro-level psychological and social-demographic aspects should also be integrated into the policy guideline and structure. Wolff and Schönherr (2005) evaluated sustainable consumption policy instruments and looked at the derived impacts and outcomes. They pointed out that sustainable consumption-related policies are everywhere, from environmental policy to agricultural, and fiscal policy. Those policies are directly or indirectly targeted at individual consumption behavior. According to the different governance mechanisms, Howlett, Ramesh and Perl (2003), Wolff and Schönherr (2011) concluded that four types of regulatory instruments exist in sustainable consumption policy: economic instruments, communicative instruments, procedural instruments, and instruments of societal self-regulation. The communicative, procedural, and societal self-regulation instruments are important and based on the governance mechanism at the micro-level, including some social aspects such as



social norms, consumer education, social responsibility, campaigns on sustainable consumption issues, and product and carbon footprint labeling.

Researchers have used ecological economics to examine sustainable consumption and production. Wiedmann, Minx, Barrett and Wackernagel (2006) used the input-output model (IO), an economic quantitative technique, to inspect industry's sustainable consumption patterns. Takase, Kondo, and Washizu (2005) presented a waste input-output model which includes the supplier-side's purchase, usage and disposal stages to evaluate sustainable consumption. The researchers estimate carbon dioxide emissions and landfill consumption to investigate the sustainable consumption of households. Hertwich (2005) relied on the life-cycle assessment (LCA), which is a tool by using both process analysis and input-output analysis, to promote sustainable patterns of consumption and production. Life-cycle assessment is a device used to assess the environmental impacts of product systems and services, accounting for the emissions and resources used during the production, distribution, use and disposal of a product (ISO 14040). In the research, Hertwich (2005) claimed that life-cycle assessment is different from the input-out model and consists of three distinct analysis steps, including: (a) the determination of processes involved in all stages of a product's life-cycle; (b) the determination of environmental pressures (emissions, use of resources, etc.) produced in each of the processes; and (c) the assessment of environmental impacts. The input and output analysis model and life-cycle assessment are two representational and effective quantitative approaches to quantify the impacts to the environment by providing and informing an exact number to household's environmental cost, such as carbon dioxide and other carbon compounds. However, using traditional LCA and IO standards is insufficient in attempting to answer how to address sustainable consumption,

proportional impact, or what consumption changes in behavior are most likely to produce positive outcomes. One should extend beyond traditional LCA and/or IO approaches. As Hertwich (2005) mentioned, a new research design is needed which can combine both economic and sociological tools to better investigate and explain sustainable consumption.

Technology is another critical component considered to be a determinant of sustainable consumption. Many empirical cases are able to conclude that application of sustainable technologies shows a remarkable influence on sustainable development, consumption, and production (Heap, Kent, & Klug, 2000; Kilbourne, McDonagh, & Prothero, 1997; Spaargaren, 2003). An environmentally-friendly technical innovation such as the PV solar panel, known as solar photovoltaic (PV) which captures the sun's energy using a photovoltaic cell, is the mostly widely recognized and symbolized sustainable energy consumed among citizen consumers; however, Spaargaren (2003) concluded that citizens react differently when social relations are paired with the application of sustainable technologies. Therefore, without considering the different societal dynamics, sustainable consumption cannot be properly understood by only looking at technological innovation alone.

Kletzan et al. (2002) also believed that economics drive the growth of material-intensive consumption and mass production. The economic competition drives manufactures to increase productivity in order to increase their income; a potential side-effect of this is an environmental crisis, such as climate change, environmental degradation, and water and air pollution (Brown & Cameron, 2000; Douglas & Isherwood, 1980; Røpke, 1999). Increasing public awareness of environmental issues may be a potential way to lead a society to move to sustainable production and consumption. However, rapid economic growth, industrial

development, and urbanization processes, increasing population, and other global issues, all weaken the power of moving toward sustainability. Even though there is a high rate of basic or general environmental knowledge among consumers, elusive knowledge about sustainable consumption and production among consumers slows the pace of sustainable development (Gilg, Barr & Ford, 2005; Haron, Paim & Yahaya, 2005; Mont, 2004)

Although the official definition of sustainable consumption was provided in 1994 at the Oslo Symposium on Sustainable Consumption, the term remains elusive. The theoretical definition of sustainable consumption stands more upon an environmental evaluation of a product or products; however, Eberle et al. (2004) believed that sustainable consumption is a social activity linked to the processes of buying, using and disposing of goods and services. Wolff and Schönher (2011) mentioned that giving a definition to sustainable consumption by just using a few terms is impossible; rather, sustainable consumption can be better understood by considering economic, social, and environmental performance indicators, collectively. In addition, sustainable consumption is a principle that needs to be integrated into everyday patterns of behavior in order to change consumer behavior (Seyfang, 2006). Such a perspective requires considering sustainable consumption from a micro-level perspective.

### **2.1.2. Micro-level Perspectives of Sustainable Consumption.**

Whereas the macro-level focuses on the supply side of consumption, the micro-level focuses on the demand side of consumption. When the concept of sustainable consumption was introduced at the 1994 Oslo Symposium on Sustainable Consumption, a social movement emerged calling for cleaner production on the supply side (for manufactures and corporations) suddenly emerged. However, the report from the United Nations Department of

Economic and Social Affairs (UN DESA) in 2010 mentioned that the national sustainable consumption and production program can no longer only focus on promoting cleaner supply side production but must also consider the economics, social, and environmental impacts of goods and services throughout the whole product's life-cycle. Sustainable consumption needs to have macro-level policy framework supports; however, it also needs to be considered within the micro-level context, which includes consumers' values and preferences. Ultimately, the market influences production and consumption patterns. Thus, micro-level individual values and lifestyles relate to consumption patterns and have the potential to further sustainable development.

Researchers have addressed the topic of sustainable consumption in a variety of ways. After an agenda of sustainable consumption and production was introduced, in order to address this problem on a micro-level, one group of researchers put their efforts toward researching the question of whether social, economic and psychological stress to individual consumers reduces part of their consumption, which is the key point and solution of sustainable consumption (Gilg, Barr & Ford, 2004; Kletzan, Köppl, Kratena, Schieicher, & Wüger, 2002). Another group of researchers believe that educating and encouraging consumers to move towards "green consumption" is a more practical approach to fostering sustainable consumption (Hertwich, 2005; Seyfang, 2007).

Although researchers have addressed sustainable consumption, it has been stated that "sustainable consumptions" must be more clearly defined. Comim, Tsutsumi and Varea (2007) mentioned that it is common for sustainable consumption to be used in research studies without defining or discussing its meaning first. Indeed, the theoretical definition of sustainable consumption from the European Commission and the Oslo definition only

displays a conceptual and pragmatic account of sustainable consumption. In order to effectively develop and evaluate the impact of such programs, the concept of “sustainable consumption” must be conceptually and operationally defined. It has been acknowledged that the precise definition of sustainable consumption is somewhat tenuous (Seyfang, 2006).

Sustainable consumption not only has the three well-known aspects, including social, environmental, and economic (Kletzan, Köppl, Kratena, Schieicher & Wüger, 2002), but it is also integrated with multiple micro-level dimensions. These micro-level dimensions include microsociology (everyday human social interactions), microeconomic (consumer behavior and decision making), micromarketing (consumer and individual marketing), social-psychology (people’s thoughts, feelings and behaviors), and social anthropology ( individual interactions within groups) (Buenstorf & Cordes, 2008; Evans & Jackson, 2008; Kolandai-Matchett, 2009; Haron, Paim, & Yahaya, 2005; Mont, 2004; Gilg, Barr, & Ford, 2005).

Consumers’ different perceptions towards sustainable consumption influences their behavioral intention which then impacts their actual consumption behavior. Vermeir and Verberke (2006) conducted a sustainable food consumption study based on consumer decision-making process theory, coupled with an existing attitude and behavior intention conceptual framework. This is a good example of a study that examined micro-level consumption behaviors by providing some important indicators which are critical and meaningful for the prediction of consumers’ sustainable consumption behavior. However, inasmuch as this study focused on the agricultural field, and some indicators may or may not be appropriate for use in studies addressing different product segments. What are sustainable products? What does sustainable consumption mean to consumers, and when and why do they use sustainable consumption? The answers differ both by the nature of the product in

question, as well as on pertinent social and psychological variables (Gilg, Barr, & Ford, 2004).

## **2.2 Defining sustainable consumption of apparel.**

This study focuses on the micro-level, specifically the demand side of consumption, and aims to inspect consumer behavior with regards to sustainable apparel product consumption. Thus, in this section, literature is reviewed to facilitate the development of conceptual and operational definitions of two concepts, “consumption,” and “sustainable” within the context of apparel.

The researcher performed a concept analysis to distinguish sustainable consumption from other related concepts. Throughout this process, the parent field of consumer behavior was referenced, as well as the more focused fields of apparel and sustainable consumption. First, Winakor’s (1969) clothing consumption model, Engel, Kollat, and Blackwell’s (EKB) model, and other related theoretical models are discussed and leveraged to help define consumption for the present study. Second, literature is reviewed to identify the attributes of sustainable apparel products and attributes of consumers’ sustainable apparel consumption behavior. Furthermore, the concept of sustainability is discussed in terms of how it relates to environmental issues and social issues. Finally, the relationship between personal attributes and sustainable consumption behavior is addressed.

### **2.2.1. The concept of “consumption”**

In the discipline of economics, “consumption” is an individual choice among different ways of acting to optimize one’s benefits, and it offers a distinct way of explaining how this choice is made (Kletzan, Köppl, Kratena, Schieicher, & Wüger, 2006). From social-psychological points of view, human beings, presented as social animals, always look and

strive for new consumption opportunities and patterns. “Consumption” is one of the important social factors that automatically leads people to get involved in social processes; one’s social identity is communicated during the processes of consumption (Buenstorf & Cordes, 2008; Dolan, 2002). Historical and socio-technical theories explain that consumption is the way people pursue better living conditions and quality of life. Individuals’ consumption behaviors are shaped and restricted by a number of socio-technical systems, such as electricity, road infrastructure, waste disposal system, water supply, etc. (Kletzan et al., 2002).

Comim, Tsutsumi, and Vereia (2007) mentioned that consumption is a key concept in economics, is theoretical in nature, and is an hedonic-oriented action that is seen as an enjoyable and enabling experience pursued by rational actors. Aldridge (2003) says that consumers are rational actors. They are the best judges of their interests; therefore, consumption is valued as a degree of autonomy. The traditional view of consumption tends to portray it as a self-interested and self-motivated individual autonomic activity. Classic consumer behavior-related theories or theoretical models, such as the consumer decision-making process, the theory of planned behavior, and the theory of reasoned action, were developed based on this traditional meaning of consumption. However, sustainable consumption entails consumption behaviors where consumers conserve energy, reduce consumption, use public transportation, and shop for eco-friendly products (Comin, Tsutsumi, & Vereia, 2007; Fuchs & Lorek, 2005; Vermeir & Verbeke, 2008). These types of behavior need ethical obligations and coercive attitudes different from traditional hedonic/utilitarian-oriented actions. To understand in more depth the attributes associated with sustainable consumption behaviors, one must first determine what consumption entails.

Researchers have defined consumption as “when individuals select, purchase, use, or dispose of product, services, ideas, or experiences to satisfy needs and desires” (Solomon & Rabolt, 2004, p.23). Yurchisin and Johnson (2010) claimed that consumption clearly doesn’t just include the behaviors of money exchanged for goods or services; rather, consumption is comprised of many steps throughout the entire consumer decision-making process. Consumption may include more intangible behaviors, such as window shopping, and reading fashion magazines. It can also include consumers’ pre-purchase behaviors, such as consumers’ need recognition and product evaluation (Yurchisin & Johnson, 2010; Jackson, 2005; Belz & Peattie, 2009). Consumption behavior includes making the final shopping decision and paying for the product or service. It also includes post-purchase behaviors, such as product maintenance and disposal activities (Jackson, 2005; Fletcher, 2008; Hethorn, 2006). To develop a conceptual definition of consumption within the context of textiles and apparel for the present study, the EKB model (Engel, Blackwell, Miniard, & Miniard, 1990), Winakor’s Clothing Consumption Model (1969), the Consumer Household Logistics System Model (Boyd & Mcconocha, 1996) and other models relating to consumption will be discussed.

#### **2.2.1a. EKB consumer decision making process model.**

Engel and Blackwell (1982) emphasized that using a consumer behavior model as a frame of reference is a rational way to discover the underlying variables and the nature of relationships between those variables. In addition, it helps to identify variables that shape and affect behaviors and manners. Research, to date, has focused exclusively on how the decision-making process and the Engel, Kollat, and Blackwell (EKB) model, relates to consumers’ sustainable consumption behaviors (Vermeir & Verbeke, 2006; Young, Hwang,



McDonald & Oates, 2010). Therefore, the aim of this section is to define the concept of consumption using the Engel, et al. (1982) six steps of decision-making process model.

According to the consumer decision-making process model from Engel et al. (1990), there are six steps in consumers' decision making process: (a) need recognition; (b) information search; (c) alternative evaluation; (d) purchase; (e) consumption, specifically usage and maintenance; and (f) post consumption evaluation (see Figure 2.1).

The first step is need recognition. This step occurs when consumers perceive there is a problem that needs to be solved. There are two types of recognition, *need recognition* and *opportunity recognition*. For instance, a consumer's need for a new wardrobe because of a lack of clothing can be viewed as need recognition, which is an actual state of customer need. On the other hand, if a customer needs a more trendy and fashionable wardrobe, this state will be viewed as opportunity recognition. Once a need (or desire) has been recognized, consumers may require sufficient product information to fill it. *Information search* is the second step. At this stage, consumers typically search for internal information and/or external information regarding retailers or products before making a purchasing decision. The third step is *pre-purchase evaluation of alternatives*. Schiffman and Kanuk (2007) state that in this stage, consumers may rely on two types of information to help them estimate their potential options included (a) a list of brands from which they plan to make their buying selection and (b) criteria that they will use to evaluate those brands. The outputs of consumers' decision making processes are purchase, post-purchase behavior and post-purchase evaluation. Purchase behavior includes three types of behaviors: trial purchase, repeat purchase, and long term commitment purchase; in the post-purchase behavior stage, consumers will use, maintain and then evaluate the products (Schiffman & Kanuk, 2007).

Based on the EKB consumer decision making process model (Engel et al., 1990), many of the individual, collective, and environmental factors manipulate consumers' actual consumption behaviors during the stages of search, alternative evaluation, and making choices. The individual factors may include subjective norms, socio-economic status and education, personal attitudes and knowledge, personal values and lifestyles, and consumers' level of involvement. The collective factors include group and family influences, social classes and situation, culture, reference groups and some expected circumstances. The environmental factors have two dimensions: marketing stimuli and environmental stimuli. Marketing stimuli includes the following: product, price, place and promotion; environmental stimuli contains economic, technological, political, culture, demographic, and natural.

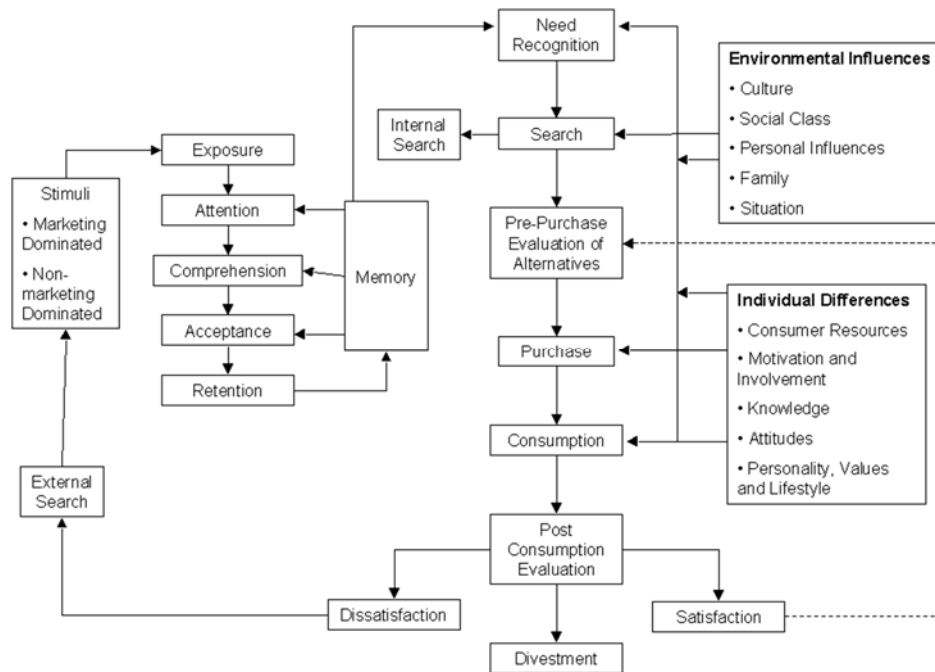


Figure 2.1. Consumer Decision Making Process (Engel et al., 1990)

### **2.2.1b. The process of clothing consumption.**

Winakor (1969) acknowledged that consumption behavior is product specific. She stated that consumers' clothing consumption includes different stages, including pre-acquisition, acquisition, usage, storage and disposal, and post-disposal evaluation. In line with this assertion, Ha-Brookshire and Hodges (2009) noted that much research has focused on consumers clothing purchasing behavior, which includes the stages of pre-acquisition and acquisition; however, there is limited knowledge about post-acquisition clothing consumption, including behavior in the product disposal stage. They concluded that the disposal state is an important aspect of clothing consumption. This is because once the consumer disposes of the used clothing, the clothing consumption cycle can continue when no longer wanted clothing is resold to a second hand retail store or donated to a charity shop which, in turn, recirculates the used clothing in the market again.

Boyd and McConocha (1996) developed a consumer household logistics system model (see Figure 2.2) that is in line with both Winakor's (1969) and Ha-Brookshire and Hodges (2009) opinions regarding consumption behavior. This model has been applied to the field of clothing, as well (Cluver, 2008). They proposed that there are four consumer activities associated with consumption. The first activity happens during the consumers' decision-making process, which is defined as the stage of pre-acquisition. During this pre-purchase process, consumers are awakened by need recognition and are directed by information search, evaluation of alternatives, and other types of mental activities. Furthermore, consumers' level of involvement impacts the behavior that results in this stage.

The second stage is acquisition and defined as an activity that happens between the buyer and seller when the actual purchasing and ordering decision has finally been made.

The third stage is called physical possession; during this stage, the consumer has ownership and physical possession of the item. Boyd and McConocha (1996) acknowledged that consumers' engagement in a variety of activities during this process include usage, maintenance and storage. The fourth stage of consumer consumption is disposition, or disposal. Indeed, they believe that consumers' product consumption cannot be as viewed as a complete behavior without taking into account post-purchasing behaviors, such as use, storage, maintenance, and disposal activities. Harrel and McConocha (1992) described that there are four disposition options for consumers that include sell/swap, pass along, donation and throw away.

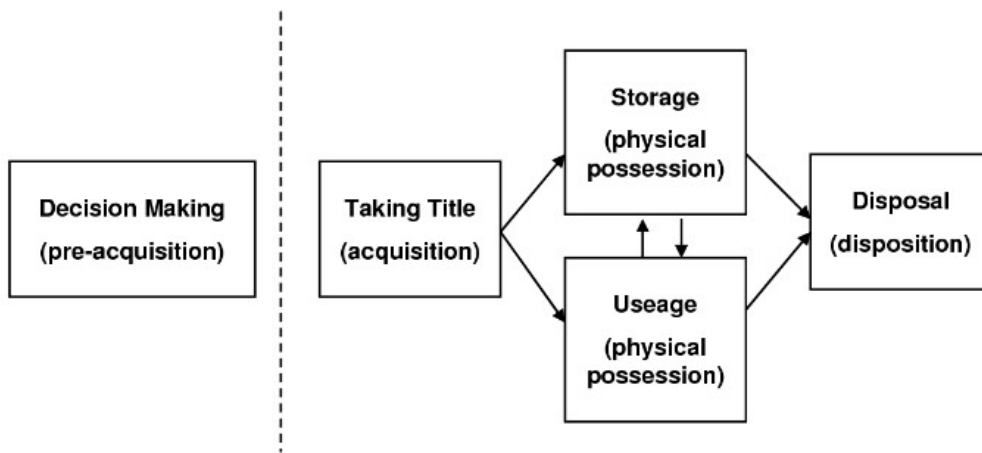


Figure 2.2 Consumer Household Logistics System Model (Boyd & Mcconocha, 1996)

### 2.2.2 The concept of “sustainable”

Now that literature has been reviewed to provide a definition of consumption for the purpose of this study, the concept of *sustainable* must also be analyzed. Furthermore, the two concepts, both sustainable and consumption must be considered as a collective and a definition of sustainable consumption must be identified. The term sustainable can mean many different things. There are several dimensions for studying sustainable consumption:

environment, ecosystems, quality of life, economic growth, urban planning, population growth, technology, system of production, and division of labor (Fuch & Lorek, 2002; Heap, Kent, & Klug, 2000; Hertwich, 2005; Kilbourne, McDonagh, & Prothero, 1997; Takase, Kondo, & Washizu, 2005; Sanne, 2002; Spaargaren, 2003; Wiedmann, Minx, Barret, & Wackernagel, 2006; Wolff & Schönherr, 2011).

Sustainable is often used to refer to products that are environmentally-responsible and/or rapidly renewable (Dolan, 2002; Fletcher, 2008; Hethorn & Ulasewicz, 2008; Maxwell & Vorst, 2003). During the 1994 Oslo symposium, sustainable consumption was defined as the use of goods and services in response to human wants and needs and to improve the quality of life, while the life-cycle of the product minimizes use of natural resources, environmental cost, toxic emission, and pollutant waste generation. Ultimately, sustainable consumption will be beneficial for future generations.

Georg (1999) believes that sustainable consumption focuses on de-materialization and responsible behavior. Sustainable consumption is the antithesis of consumerism that can be categorized as the purchase of useless, inferior, or dangerous products, the delivery of misleading advertising, and pricing goods in an unfair manner. Comim et al. (2007) advanced four specific principles that could provide a better conceptual structure of sustainable consumption. These principles include informational space for normative evaluation (individuals' quality of life and quality of environment), instrument (individuals' resource-using ability), mechanism (inter-temporal balance between positive and negative freedoms) and the main ethical principle (respect for individual autonomy, promoting autonomous consumption). O'Neill and Chen (2002) believed that in order to achieve sustainable consumption strategies, self-motivated behaviors, e.g., consuming less, disposing of the

products responsibly, and buying locally-made products, should be practiced among consumers. Comim, et al. (2007) also believed that ethical principles are important, because the selected norms and values will impact sustainable consumption policies. They mentioned that policy-makers or governments should not define the operational objects of sustainable consumption; on the contrary, it should be embedded into public reasoning structure. Therefore, the socially-based indicators are critical to understanding sustainable consumption. Consumers will automatically choose sustainable consumption to the degree that they view it as contributing to their quality of life (Hezri & Dovers, 2006).

#### ***2.2.2a. Attributes of sustainable apparel products.***

In the literature review chapter, the researcher concluded that the three main attributes associated with consumption are *pre-acquisition*, *acquisition* and *post-acquisition*. Since purchasing sustainable products is also an aspect of sustainable consumption, the following section will review criteria used to determine the level to which an apparel product is sustainable.

During the information search and alternative evaluation stages of the consumer decision making process, it seems logical that an individual practicing sustainable apparel consumption would seek out information regarding product sustainability. Thus, we cannot measure a consumer's sustainable apparel consumption at these stages until we know exactly what we mean by "sustainable." What criteria should a product meet before it can be considered a sustainable apparel product? Haron, Palm, and Yahaya (2005) mentioned that most consumers may have a general or basic knowledge about environmental impact, but they cannot go into more detail when they were asked about some scientific environmental

terms. The World Business Council for Sustainable Development (WBCSD) claimed that extending the product life through increasing the intrinsic durability, reusability, reparability or upgradability is the way to slow down resources consumption and contribute toward moving to sustainable consumption and production. Von Weizsäcker (1997) mentioned that durability is the most significant way to reduce waste and increase the resource productivity relating to sustainability utilities. McLaren , Bullock, and Yousuf (1998) believed that durability, alongside reuse and recycling, are the critical principles to enhancing overall production and consumption efficiency.

Therefore, based on the general conclusions from previous research studies, durability (product life extension) plays a central role in defining sustainable products. However, previous research studies rarely specified the product categories when they concluded the characteristics of sustainable products among different product categories; for instance, the importance of durability is obviously not consistent with the sustainable product definition in food science. Therefore, in this study, the researcher used The Higg Index 1.0 as a reference guideline to conclude the criteria for sustainable textile and apparel products. The Higg Index 1.0 is an environmental tool designed to advance sustainability practices within the outdoor industry and provides guidance to better understand what constitutes a truly sustainable apparel product. The Higg Index 1.0 was the first “apparel tool” to provide “companies throughout the supply chain a way to benchmark and measure their environmental footprint, allowing them to identify areas for improvement and make informed sourcing and product life-cycle decisions (Ourdoor Industry Association, 2012).” The Higg Index 1.0 includes product design guidelines from materials (feedstock, raw materials, and processing), packaging, manufacturing and assembling, transportation, use and end of life, and evaluates

companies' land, water and energy use, biodiversity, waste, chemical/toxics emissions to the environment, and people involved in the product's complete life cycle (Sustainable Apparel Coalition, 2012).

The Sustainable Products Corporation defines sustainable products as products that provide environmental, social and economic benefits while protecting public health, welfare, and environment over their full commercial cycle, from the extraction of raw materials to final disposition. SMART © Sustainable Textile Standard 2.0 (2004) has six criteria regarding sustainable textiles (fabric and apparel) which are:

1. Healthy and harmless to people and environment.
2. Can be recycled and reused for other purposes.
3. Have good quality, longevity and durability.
4. The product-life-cycle, from the raw material to the product end-of-life, has minimum environmental impact.
5. Made from natural, bio-based materials and treated by using bio-based or natural procedures.
6. The product-producing processes are ethical.

#### *Healthy and harmless to people and environment*

Many textile and apparel products have residual toxic ingredients left over on the surface of the product that can threaten the consumers' health when it gets released, such as formaldehyde which is release from fabrics and can highly affect human and environmental health. A significant amount of formaldehyde ingredients have been found in denim products. Sustainable apparel should not contain and release any toxic chemicals, like formaldehyde, to



the wearer or the environment (Fletcher, 2008; Hethorn & Ulasewicz, 2008; SMART © Sustainable Textile Standard 2.0, 2004).

*Can be recycled and reused for other purposes*

Sustainable apparel should be reusable and/or recyclable, so the end-of-life of those sustainable apparel products will generate other opportunities (raw materials) for making new products (Fletcher, 2008; Hethorn & Ulasewicz, 2008).

*Have good quality, longevity and durability*

Sustainable apparel products need to have durable construction and/or be made from durable materials. Sustainable fashion can also mean classic styles and good designs that do not fall out of fashion (Fletcher, 2008). Sustainable apparel is that which individuals can wear and use for a relatively long time (Hethorn & Ulasewicz, 2008).

*Made from natural, bio-based materials and treated by using bio-based or natural procedures*

Sustainable apparel should be made from renewable and biodegradable natural fibers or fabrics because natural fibers and fabrics are biodegradable and the products' end-of-life will have fewer loadings in the environment (Fletcher, 2008; Hethorn & Ulasewicz, 2008; Weller & Walter, 2010). In addition, sustainable apparel needs fibers and fabrics treated in an eco-friendly manner during the production processes. For instance, natural enzymes, bio-based pesticides, natural dyeing, eco-friendly bleaching and de-sizing are all methods that use environmentally-friendly chemical solvents (Fletcher, 2008; Hethorn & Ulasewicz, 2008; SMART © Sustainable Textile Standard 2.0, 2004).

*The product producing processes are ethical*

The products are created without using child labor or sweatshops, without pushing the workers to work overtime, by paying health insurance to the laborers, and the production processes should not threaten the workers' health (Dickson, Loker, & Eckman, 2009; SMART © Sustainable Textile Standard 2.0, 2004; The Higg Index 1.0, 2012).

*The product-life-cycle, from the raw material and the product end-of-life, has minimum environmental impact*

This criterion required a systemic consideration of life-cycle assessment analysis and includes the following: product design, material usage, processing, production, sourcing, shipment and distribution, product maintenance, and end-of-life management. Each stage of the life-cycle should guarantee that it has minimum environmental impact (Hertwich, 2005; Weller & Walter, 2010; SMART © Sustainable Textile Standard 2.0, 2004; The Higg Index 1.0, 2012;)

Therefore, sustainable apparel products not only have longevity with regards to durability, fashionability, reparability, maintainability, and upgradability, but they also are produced and disposed/recycled in a way that minimizes environmental impact (Dickson, Loker, & Eckman, 2009; Fetcher, 2008; Hethorn & Ulasewicz, 2008; Weller & Walter, 2010; SMART © Sustainable Textile Standard 2.0, 2004; The Higg Index 1.0, 2012).

#### ***2.2.2b. Attributes of sustainable apparel consumption behavior***

Sustainable consumption is a multi-dimensional term that may relate to other types of consumption behavior, such as green consumption, buying with social responsibility, or consuming less.

In studies, “green consumption” is a term that is sometimes used interchangeably with sustainable consumption. Gild, Barr, and Ford (2005) developed a scale to measure consumers’ green consumption behavior. They stated that the following are green consumption activities:

1. Purchasing products which have a reduced environmental impact.
2. Avoiding buying products containing aerosols.
3. Purchasing recycled paper products.
4. Buying organic products.
5. Purchasing products from local stores.
6. Buying fair-trade products.
7. Buying locally made products.
8. Looking for products that have less packaging.
9. Using one’s own bag rather than a plastic bag provided by the store.

Within an academic online database, a search for articles containing “sustainable consumption” in their titles was performed. This search rendered a total of 67 articles. Within each article, the attributes associated with sustainable consumption were identified. The attributes were coded and categorized according to common themes that are reported in the results section of this paper.

A concept analysis was conducted to identify the characteristics of sustainable consumption as a concept. The process outlined by Walker and Avant (2011) was used as a guide to perform a concept analysis. Identifying defining attributes is the heart of a concept analysis. Attributes are the characteristics or components of a concept.

The attributes of sustainable consumption could not be identified within six articles. In the remaining 61 articles, defining attributes ranged from broad to specific. In seven articles, sustainable consumption was defined broadly and incorporated the balance of fulfilling needs, preserving quality of life, using resources efficiently, minimizing waste and pollutants, and minimizing negative impact on humans in the present and future. Most articles did not provide such a holistic approach; however, attributes identified in the remaining articles often supported these broad definitions. The remaining 54 articles mentioned specific attributes associated with sustainable consumption. Attributes, as shown in Table 2, include consuming items with less ecological impact (17 articles); consuming environmental friendly products such as green products, and/or eco-label products (10 articles); consuming fewer, simplifying consumption, efficient consumption and dematerialization (20 articles); using services rather than buying new product (six articles); consuming locally-made products (three articles); considering product life-cycle in decision making (four articles); disposing products responsibly in order to minimize waste (three articles); considering the longevity and durability of a product in decision making (three articles); buying reusable or recyclable product (four articles); engaging in responsible and ethical behaviors (12 articles); the process of selection, purchase, use, maintenance, repair and disposal (five articles); and, being willing to pay for the environmental costs associated with a product (one article). It is important to note that within ten articles, sustainable consumption was discussed within the context of the entire consumption, ranging from pre-acquisition, acquisition and post-acquisition stages. Table 2 shows the frequency of attributes identified, as well as the corresponding articles in which the attributes were listed.

Table 2.1 Attributes of sustainable consumption

Attribute	Number of citations	Citations
Less ecological impact consuming behaviors*	17	Briceno, Peters, Solli, & Hertwich, 2005; Boulanger, 2010; Hobson, 2002; Comin, Tsutsumi, & Vereia, 2007; Cooper, 2002; Haron, Paim, & Yahaya, 2005; Hertwich, 2003; Killbourne, McDonagh, & Prothero, 1997; McLaren, Bullock, & Yousuf, 1998; Mont,2004; Nowosielski, Spilka, & Kania, 2007; Seyfang,2005; Seyfang, 2006; Spaargaren, 2003; Wiedmann, Minx, Barrett, & Wackernagel,2006; Wolff & Schönherr, 2011; Veenhoven, 2004
Consuming green ,eco-label, fair trade, environmental friendly product *	10	Georg, 1999; Fuchs & Lorek, 2005; Horne, 2009; Kietzan, Köppli, Kratena, Schleicher, & Wüger, 2002; Kong, Salzmann, Steger, & Ionescu-Somers, 2002; Seyfang,2005; Spangenberg & Lorek, 2002; Seyfang & Paavolab, 2008; Ursula & Schrader, 1997; Vermeir & Verbeke, 2008
Using services rather than buying new product *	6	Hobson, 2002; Kolandai-Matchett, 2009; Kietzan, Köppli, Kratena, Schleicher, & Wüger, 2002; Mont, 2004; Thomas & Graedel, 2003; Hansen & Schrader, 1997 <i>(table continues)</i>

<b>Attribute</b>	<b>Number of citations</b>	<b>Citations</b>
Consuming locally produced product	3	Seyfang, 2004; Seyfang, 2005; Seyfang, 2006
Consider product life cycle in decision making	4	Cooper, 2002; Comin, Tsutsumi, & Vereza, 2007; Hobson, 2002; Spangenberg & Lorek, 2002a
Disposing of product responsibly	3	Comin, Tsutsumi, & Vereza, 2007; McLaren, et. al, 2008; Spaargaren & Mol, 2008
Consider the longevity and durability of a product in decision making	3	Cooper, 2002; Herwich, 2005; Kolandai-Matchett, 2009
Consuming reusable or recyclable product	4	Haron, Paim, & Yahaya, 2005; Killbourne, McDonagh, & Prothero, 1997; Seyfang, 2005; Thomas & Graedel, 2003
Engaging in responsible and ethical behavior *	12	Dolan, 2002; Kolandai-Matchett, 2009; McGregor, 2002; Middlemiss, 2008; Seyfang, 2003; Seyfang, 2005; Seyfang, 2006; Spaargaren & Mol, 2008; Ursula & Schrader, 1997; Vermeir & Verbeke, 2006; Tsutsumi, & Vereza, 2007; Wolff & Schönherr, 2011
Including the process of selection, purchase, use maintenance, repair and disposal	5	Evans & Jackson, 2008; Gild, Barr & Ford, 2005; Haron, Paim, & Yahaya, 2005; Spangenberg & Lorek, 2002; Wolff & Schönherr, 2011
Being willing to pay for the environmental cost associated with a product	1	Kong, Salzmann, Steger, & Ionescu-Somers, 2002

*Note: \* Critical attributes*

*Less environmental impact consuming behaviors.*

Consumers believe they need to buy products with lower environmental impacts. However, this requires knowledge of which characteristics determine fewer ecological impacts. Fewer ecological impacts through the life-cycle of the product include the use of fewer natural resources used (e.g. water, energy, material), lower toxin (water and material wastes) and pollution emissions (water and air pollution) and the product's bio-degradability, reusability, or recyclability to generate new end-of-life opportunities for the product (becomes new raw materials) instead landfill or incineration disposal (Briceno, Peters, Solli, & Hertwich, 2005; Hobson, 2002; Veenhoven, 2004; Wolff & Schönherr, 2011). For instance, consumers may purchase fewer blue jeans from knowing that their life-cycle has a hugely negative impact upon the eco-system; or consumers may prefer to buy a product that is locally made, because they know that global sourcing is associated with a huge environmental impacts (carbon oxidant emissions during raw material and product shipments from county to country) (Air Quality Sciences, Inc, 2010; Briceno, Peters, Solli, & Hertwich, 2005).

*Consuming "green" products and buying product with an "eco" label.*

This attribute emphasizes an environmental perspective. "Green product" means the product's life-cycle is environmental friendly. Overall, green products need to meet certain criteria. Criteria might include the following: made from using natural and/or renewable resources, made from recycled materials, manufactured using processes free from highly toxic compounds, made by local manufacturers, and/ or made from locally produced, recyclable and/or reusable materials (Air Quality Sciences, Inc, 2010). "Green" textile and apparel products can be viewed as follows:

1. The raw materials were harvested from organic farms, and no toxic materials or chemical ingredients have been used (un-bio-based herbicides, pesticides).
2. The treatments of the fabrics processes, e.g., dyeing, bleaching, de-sizing, rising, etc. are guaranteed not to use harmful toxic materials and chemicals which threaten the health of the labors and consumers (The Higg Index 1.0, 2012; SMART © Sustainable Textile Standard 2.0, 2004).
3. The production processes do not use sweatshops or child labor.
4. The transportation and shipment in the sourcing and distribution processes have limited carbon dioxide emissions (Fetcher, 2008; Weller & Walker, 2010). It may also mean the product itself is bio-degradable, reusable, and/or recyclable (The Higg Index 1.0, 2012; Fetcher, 2008; SMART © Sustainable Textile Standard 2.0, 2004; Walker, 2010; Weller & Air Quality Sciences, Inc, 2010).

Buying products that meet some or all of these criteria can be classified as sustainable consumption behavior.

“Eco” labels signify similar meaning to a product that is labeled as “green.” The only difference is that this product attribute, having an eco-label, requires that consumers are able to identify the specific meanings behind the different labels displayed on products (Horne, 2009). There are many third parties that have the authority to offer eco-labels to brands and products. Some third parties offer the honor to brands or products which have a clean production process (e.g., SMART © Sustainable Textile Standard 2.0, 2004, The Higg index 1.0, 2012; International Federation of Organic Agriculture Movement (IFOAM); Oeko-Tex Standard; Sustainable Clothing Action Plan). Some third parties offer eco-labels because the products use renewable energy ( e.g., SMART © Sustainable Textile Standard 2.0, 2004; The



Higg Index 1.0, 2012). In addition, some third parties offer bio-based raw materials labels because the products use organic materials (e.g., National Organic Program (NOP); International Federation of Organic Agriculture Movement (IFOAM); Quality Assurance International (QAI); ECOCERT International.)

*Consuming fewer, simplify consumption and efficient consumption.*

Sustainable consumption is a type of consumption behavior that practices responsible and rational consumption instead of “over-consumption” or “conspicuous consumption.” Many researchers believe that consuming less (buying fewer products) could be the most significant method to make the world move toward sustainability (Buenstorf & Cordes, 2008; Church & Lorek, 2007; Horne, 2009; Kietzan, Köppli, Kratena, Schleicher, & Wüger, 2002; Kolandai-Matchett, 2009; McDonald, Oates, Young, & Hwang, 2006). When consumers consider if they actually need a product during their consumption decision-making process, they are engaging in sustainable consumption. For instance, if you have already have two similar styles of blue jeans in your closet, do you really need to buy another one just because of its inexpensive price or because it is on sale? If you can borrow a cocktail skirt from your friend for a one time activity, is it necessary to buy a new one? Thinking about other alternatives which can be used as substitutes to reduce consumption will automatically reduce the natural resources costs and waste, which in turn make people move toward sustainable consumption (Kong, Salzmann, Steger, & Ionescu-Somers, 2002; Reisch, 2001).

Increasing numbers of consumers have realized that over-consumption and conspicuous consumption are not appropriate anymore, because those activities will put more stress on the environment; therefore, they attempt to minimize unnecessary consumption and

lessen the amount of items they purchase (McDonald, Oates, Young, & Hwang, 2006; Reisch, 2001). Examples include taking public transportation or carpooling instead of driving one's own car to work, taking trains instead of airplanes for travelling, using a substitute or service instead of buying a new product, renting a fancy dress for a one-time party instead of buying a new one, and trying to mend your handbag instead of throwing it away.

*Consuming services instead of products.*

Sustainable consumption places emphasis on customers' service systems. If companies can provide more services for customers in the post-purchase phase of consumption, such as maintenance services or mending services, consumers may not need to buy new products to replace products that have become worn (Hobson, 2002; Kietzan, Köppli, Kratena, Schleicher, & Wüger, 2002; Kolandai-Matchett, 2009; Thomas & Graedel, 2003; Hansen & Schrader, 1997). This alternative ultimately leads to a decrease in the number of items consumed by individuals (Mont, 2004).

*Consuming locally-made products.*

Several environmental related studies mention that global sourcing contributes to a significant portion of carbon oxidant emissions (Hertwich, 2005; Heiskanen, Johnson, Robinson, Vadovics, & Saastamoinen, 2009). An example of a typical textile and apparel production format is as follows. First, a European fashion brand found that cotton fiber from China has the best quality and an acceptable price, so they brought the raw material from China and asked them to process the cotton crop into original fabrics. Then, the cotton fabrics are shipped to a Mexican manufacturer for production. The manufacturers in Mexico attach artificial jewels shipped from India to finish the final garment. Finally, these products are distributed all around the world. The shipment processes associated with global sourcing

is associated with a huge amount of natural resource use and carbon dioxide emissions (Fuchs & Lorek, 2002). Thus, buying a product that is locally made will give financial support to locally-sourcing companies, and consumers actually consciously or unconsciously reducing environmental impact associated with transport (Seyfang, 2004; Seyfang, 2006, Seyfang, 2007).

*Consider the product life-cycle during the decision-making process.*

Many corporations consider in-put, out-put, and the environmental impact associated with product life-cycles to inform their decision-making regarding production (Hertwich, 2005; Takase, Kondo & Washizu, 2005). The life cycle of apparel products is associated with several stages: product design, raw materials production, sourcing and manufacturing, product distribution process, product maintenance, and final disposal (Business for Social Responsibility, May, 2008). For instance, if consumers have two favorable alternatives for a dress-shirt, one is a US made hemp dress-shirt with natural dyeing and the other one is an imported cotton dress-shirt. These two alternatives have similar prices with the hemp dress-shirt, perhaps, slightly more expensive. If consumers think about the product life-cycle, and finally make the choice of buying the locally-made hemp shirt, this behavior is considered a sustainable consumption behavior.

*Disposing of the product responsibly and appropriately*

This attribute means that consumers need to consider the end-of-life management processes (the final disposal stage) of unwanted products. Consumers may seek alternatives to extend the life-span of the products. Some options include reselling the unwanted products to second-hand clothing stores, exchanging unwanted clothing with other people for their unwanted clothing, giving the clothing away to someone else, and donating the clothing to a

charity organization (Ha-Brooksire & Hodges, 2009). The core point of this attribute is to choose options that keep apparel items out of landfills.

*Consider the longevity and durability of a product in decision making*

Sustainable consumption of clothing not only entails consuming less, buying “green” or “eco-label” products, or disposing of products in a way that extends the lives of the products, but is also entails consuming products that are of good quality and have a classic design that extends their usable life (Fetcher, 2008). Buying good quality and classic design clothing can automatically reduce the frequency that consumers discard and replace apparel products (Jackson, 2003).

*Consuming recyclable and reusable products*

Recycling is a technique of reusing and reprocessing post customers and/or post industrial waste (Deschamps, 2012; Fetcher, 2008). The textile and apparel industry is gravitating toward using recycled fabrics or fibers as one of the important raw materials resources. Technically speaking, only clothing or textile products made from one type of fiber can be 100% recycled back into a fiber, such as 100% polyester or 100% nylon. So those 100% single content textile and apparel products are always easy to go through the recycling process. However, a fabric with mixed content, such as a fabric made from 60% cotton, 20% spandex, and 20% polyester; or a fabric that incorporates coatings, nanotechnologies, and multi-layers, may not be able to be completely recycled or reused for another purposes (Deschamps, 2012; Fetcher, 2008). If consumers can buy products made from one type of fiber and without finishes that render a product unrecyclable, the challenges associated with recycling are decreased.

Reusable products are those that can be re-used for the same purpose, resold, or redistributed (Fetcher, 2008). Reusable products can account for significant environmental savings. In the case of clothing, if an item is collected, sorted and resold, the total environmental cost for these processes will be 10 to 20 times less than the cost to produce a new item (Fetcher, 2008).

*Engaging in responsible and ethical behavior*

One attribute of sustainable consumption is engaging in environmentally and socially responsible behaviors throughout one's consumption. Consumers should understand that consumption is not just an individual activity to satisfy their needs and wants. Consumption is also related to sustaining the eco-system, the health and economic stability, and to showing respect for human and animal rights (Boulanger, 2010; SMART © Sustainable Textile Standard 2.0, 2004). Therefore, sustaining the eco-system, as well as contributing to the health and well-being, including economic health, of the global society, and demonstrating universal respect of the rights of both human beings and animals are critical attributes that differentiate sustainable consumption from other types of consumption.

As mentioned earlier, sustainable consumption is a type of pro-environmental behavior. The person who participates in this activity is motivated by ethics. Ethics help people identify right from wrong, restrict human activities, and lead people to act in a moral manner (Jackson, 2005; Schrader, 2007). For instance, a consumer who is aware that a product is made in a sweatshop by child laborers, but chooses to purchase the product anyway is not engaging in ethical behavior. On the other hand, purchasing brands or products produced by companies with socially responsible reputations is considered ethical behavior (Devinney, Auger, Eckhardt, & Birtchnell, 2006).

*Including the process of selection, purchase, use maintenance, repair and disposal*

Niinimäki and Hassi (2011) investigated consumers' interests in clothing design strategies associated with sustainable apparel products. They discovered that most consumers are more likely to purchase clothing that can be worn long-term, repaired, modified, recycled, and/or upgraded. As discussed previously, consumption is a behavior that involves pre-acquisition (need recognition, information searching, and evaluation), acquisition (taking title), and post-acquisition (use maintenance, repair and disposal) stages (Boyd & McConocha, 1996; Engel et al., 1990). Therefore, in order to better understand sustainable consumption, researchers need to look at all stages of consumption.

*Willing to pay extra for the environmental cost associated with the product*

Some articles mentioned that if consumption cannot be avoided or reduced, persuading and encouraging consumers to pay extra money for the environmental costs associated with the product's life-cycle is another alternative (Kong, Salzmann, Steger, & Ionescu-Somers, 2002). Many European Union countries and the U.S. are applying this alternative, e.g., consumers are required to pay extra money for beer bottles to offset the cost for recycling the bottles.

### **2.2.2c. Sustainability as it relates to corporate social responsibility.**

*Corporate social responsibility*

Most consumers want to be socially and environmentally conscious (Chan & Wong, 2012; Haron, Palm, & Yahaya, 2005); however, it is still difficult for consumers to identify what they could do to act as a sustainable consumer. Increasing the number of consumers and company shareholders that use corporate social responsibility (CSR) strategies as criteria to determine if the company or the product offered from that company contributes to efforts of

sustainable development (Dickson, Loker & Eckman, 2009). For instance, consumers may have an emotional commitment towards a brand or a company engaged in social responsibility campaigns. Examples of such campaigns include Gap's RED label campaign (donating 50% of all Product Red profits directly to the Global Fund) and Patagonia's pledge for 1% of sales to aid in the preservation and restoration of the environment. Consumers are more likely to shop from these retailers and companies, because they have created an image of positive corporate social responsibility. Therefore, corporate social responsibility is an important factor that should be added to the consumers' sustainable apparel consumption (SAC) scales

**2.2.2d. Two dimensions of social responsibility: environmental responsibility versus social responsibility.**

Social responsibility is an ethical concept. The broad definition of social responsibility is "achieving commercial success in ways that honor ethical values and respect people, communities and the natural environment (McWilliams & Siegel, 2001)." Social responsibility has received much attention from apparel brands, retailers and consumers (Dickson, Loker, & Eckman, 2009).

*Social responsibility in the environmental aspect*

Environmental social responsibility in apparel and textile industry means that the companies need to maintain the environment by taking actions to promote a positive physical environment (Dickson & Eckman, 2006). The major environmental impacts of the production and use of textile fibers and apparel include (Dickson, Loker, & Eckman, 2009, p.19) energy used to produce materials and final products, chemicals used during the growing, production, and processing of textiles and apparel, water and air emissions during

production, dyeing, finishing, and laundering, and solid waste generation during production and disposal.

*Social responsibility in the social aspect*

The social aspect of social responsibility is related to balancing ethics and morality with companies' profitability (Dickson & Eckman, 2006). A big portion of the social aspect of social responsibility is from labor issues during the production and sourcing of apparel products. Dickson, Loker, and Eckman (p. 6, 2009) mentioned "eight issues associated with the social aspect of social responsibility including forced labor, low wages, excessive work hours, discrimination, health and safety hazards, psychological and physical abuse, lack of awareness of workers' rights, and lack of worker representation for negotiations with management."

Consumer social responsibility is an emerging concept. This concept, different from corporate social responsibility, is represented in three ways. The first is consumer engagement in specific causes such as donations or willingness to be involved in protests and boycotts. The second is engaging in socially responsible purchasing or non-purchasing behavior. The third is expressing socially responsible opinions in surveys or other forms of market research (Devinney, Auger, Eckhardt, & Birtchnell, 2006). They believed that consumer social responsibility is a conscious and rational choice based on consumers' personal and moral beliefs. Therefore, ethical and social components of consumer social responsibility may be correlated with consumers' sustainable consumption behaviors.



### **2.3. Related scales: Scales and Theories Associated with Sustainable Consumption**

Researchers have developed scales that should relate to the concept of sustainable consumption. These scales measure individuals' environmentally oriented attitudes and/or behaviors. Environmental concern, which echoes throughout many of these scales, is a critical and universal concept that has been used in environmental sociology and related behavior studies for over fifty years (Dunlap & Jones, 2002; Dunlap & Van Liere, 1978; Maloney, Ward, & Brauch, 1975; Weigel & Weigel, 1978). Ester and van der Meer (1992, p.72) define environmental concern as "the degree to which a person recognizes environmental problems and is ready to contribute to their solution." Dunlap and Jones (2002, p. 485) revised this concept to "the degree to which people are aware of problems regarding the environment and support efforts to solve them and/or indicate a willingness to contribute personally to their solution."

Because the purpose of the present research project is to develop a valid and reliable sustainable apparel consumption scale, it is important to identify related scales that may be used to evaluate the convergent and discriminant validity of the scale under development. Therefore, the following will be discussed in detail: the New Environmental Paradigm scale (revised in Dunlap et al., 2000), the Ecology scale (Maloney, Ward, & Brauch, 1975), the Environmental Concern scale (Weigel & Weigel, 1978), environmental concern as measured by Niinimaki and Hassi (2011), eco-fashion consumption as measured by Niinimaki (2010), the Green Consumption scale (Gild, Barr, and Ford, 2005), and the Intended Pro-environmental behavior scale (Cordano, Welcomer, & Scherer, 2003).

### **2.3.1. New Environmental Paradigm (NEP).**

The NEP scale was first developed by Dunlap and Van Liere in 1978 to measure an individual's level of environmental orientation. The NEP focuses on environmental aspects rather than social aspects. Dunlap and Van Liere (2002, p.427) defined the New Environmental Paradigm as an instrument that measures environmental orientation, a concept that focuses “on individuals' beliefs about “humanity's ability to upset the balance of nature, the existence of limits to growth for human societies, and humanity's right to rule over the rest of nature.” They developed a 12-item Likert scale to measure these three conceptual layers. In the initial scale, individuals rated all 12 items on a one to four scale, with four for “strongly agree,” three for “mildly agree”, two for “mildly disagree”, and one for “strongly disagree”. The participants were asked to indicate the extent to which they agree or disagree with each of the 12 items.

The original NEP scale had sufficient internal consistency, with a Cronbach's alpha of 0.81. Dunlap and Van Liere (1978) examined the frequency distribution and mean values of all the scale items and determined that they could sum respondents' scores on all 12 rating items; in turn, each respondent could be assigned a score ranging from a low of 12 to a high of 48.

Dunlap, Vanliere, Mertig & Johns (2000) found that the initial NEP scale failed to balance wording of pro-NEP items (eight items) and anti-NEP (four items). They also identified a need to add two facets of an ecological worldview. The first facet includes the respondents' feeling about modern industrial society (human exemptionalism). The second facet includes the respondents' notion of ecological crisis (the risk of an eco-crisis).

Therefore, the revised NEP scale now has 8 pro-NEP items and seven anti-NEP items. Furthermore, Dunlap, et al. (2000) identified five dimensions within this revised scale: (a) human dominance over nature; (b) human exemptionalism; (c) balance of the nature; (d) the risk of an eco-crisis; and (e) limit to growth. This scale had a higher internal consistency. The Cronbach's alpha of this scale was 0.83 (Dunlap, et al. 2000) (see Appendix B).

### **2.3.2. Ecology scale (Maloney, Ward & Braucht, 1975).**

Maloney and Ward (1973) developed an ecological attitude-knowledge scale that consists of 128 items. This measurement scale aims to determine what the population knows, thinks, feels, and actually does regarding the issue of environmental pollution (Maloney, Ward, & Braucht, 1975). They believed that understanding people was the critical antecedent step that one needs "to make before an attempt can be made to modify critically relevant behaviors" (Maloney & Ward, 1973, p.584). The original ecology scale is comprised of four subscales: the Verbal Commitment scale (VC), the Actual Commitment scale (AC), the Affect scale (AC), and the Knowledge scale (K). The VC scale consists of 31 items and measures what a person states he is willing to do in reference to pollution-environmental issues. The AC scale consists of 36 items and measures what a person actually does in reference to pollution and environmental issues. The AC scale consists of 37 items and measures the degree of commitment to environment protection. The K scale consists of 24 items and measures specific factual knowledge related to environment and pollution issues.

The revised ecological attitude-knowledge scale was developed in 1975 by Maloney, Ward and Braucht. This short form contains 45 items. The authors examined the frequency distribution, correlation for all scale items, and the correlation between the original and revised scale. Ten items were identified for the Verbal commitment (VB) scale. Ten items

were identified for the Actual commitment (AC) scale. Then items were identified for the Affect (A) scale. Fifteen items were selected for the Knowledge scale. The internal consistency of this measurement scale had a 0.85 alpha coefficient value.

### **2.3.3. Environmental concern (Weigel & Weigel, 1978).**

Weigel and Weigel initially developed the Environmental Concern scale in 1978. The purpose of the scale was to assess an individual's relatively enduring beliefs and feelings about the environment to anticipate his or her pro-environmental action. This scale is composed of 16 statements that focus on a wide range of pollution and conservation issues. They used a 5-point Likert scale ranging from "4=strongly agree" to "0=strongly disagree.

### **2.3.4. Environmental concern in apparel.**

Niinimäki and Hassi (2011) investigated consumers' responses to sustainable clothing and textiles in several aspects, such as consumers' environmental concerns and clothing influence consumers' purchase behaviors; furthermore, in order to create opportunities for sustainable development and consumption in clothing, they investigated consumers' interests in sustainable design in clothing and textiles. In their studies, they identified five items that were considered as the most important aspects for consumers buying sustainable textile and clothing and ranked them by percentage value of the statement "totally or somewhat agreed."

Participants were asked to rank the following five statements:

1. The "Made in Finland" aspect in textile and garments is important to me.
2. It is important to me that textile production has a small environmental impact.
3. I want to know about the production and environmental impact of the garments I am purchasing.
4. I am worried about the ethics of textile and clothing production.

5. I was worried about the environmental impact of textile and clothing production.

In addition, they also found eight phrases of the product life cycle that worry consumers (ranked them by percentage value of the statement “totally or somewhat agreed”). Participants ranked the following eight criteria: (a) location of manufacturing; (b) product processing; (c) lifetime of the product; (d) transportation; (e) cultivation of fiber; (f) disposal of the product; (g) fiber processing; and (h) use phase (the use of water and energy) of textile and clothing product life cycle that will be evaluated by consumers.

Niinimäki and Hassi (2011) also ranked consumers’ interest in sustainable clothing and eco-friendly design strategies by using the percentage value of the statement “totally or somewhat agreed.” They found out that 86% and 83% of respondents totally or somewhat agreed with the following two statements, respectively: “I could use repair and modification services” and “garments have to be suitable for recycling.” The statements of “Garments could be upgradeable;” “I am interested in the customization possibilities of garments;” “Manufacturers could offer exchange and return service for garments;” “I can rent garments for short-term use;” “I am interested in taking art in the design process;” and “I am interested in clothing with a modular structure, because I could repair” had lower percentage scores which were 72%, 68% , 68%, 62%, 61% and 60%, respectively. The statements of “I am interested in affecting the manufacturing process;” “Garments have to be designed for an optimal use period, and the optimal use period has to be communicated;” “I can rent garments for long-term use;” and “I could buy short-lifetime garment, which does not need any washing during its short life span” had the lowest percentage values at 52%, 50%, 22% and 11%, respectively.

### **2.3.5. Eco-fashion Consumption (ECO).**

Niinimäki (2010) defined Eco-fashion consumption as the purchase of eco-fashion products. Eco-fashion is defined as the type of clothing that is designed and produced to maximize benefits for people and society and to minimize environmental impacts (Joergens, 2006; Claudio, 2007; Ochoa, 2011). Eco-fashion consumption is considered to be a type of sustainable consumption that encourages producers to move towards more environmentally friendly sourcing, production and distribution (Chan & Wong, 2012; Claudio, 2007; Young, et, al., 2010). Chan and Wong (2012) used a Likert scale (“1”=0-20 percent; “5”=81-100 percent) to measure fashion consumers’ eco-fashion consumption decisions. This eco-fashion consumption measurement scale was adopted from Roberts (1996) and Robert and Bacon (1997). Three items were found in the set of items and included:

1. I will buy clothing that is durable.
2. I will buy clothing with recycled content.
3. I will buy clothing that is safe to the environment.

This measurement construct reliability was indicated having above 0.6 Cronbach’s alpha.

### **2.3.6. Intended pro-environmental behavior scale (PEB).**

Cordano, Welcomer, and Scherer (2003) modified a scale which is used to measure people’s Pro-environmental behavior intention. This scale’s Cronbach’s alpha is 0.88. There are six items using response scale ranging from “1”=strongly disagree to “7”= strongly agree which included:

1. I would sign a petition to support stricter environmental laws.

2. I would participate in a protest against a company that is harming the environment.
3. I would participate in protests against current environmental conditions.
4. I plan to participate in events organized by environmental groups.
5. I would distribute information published by environmental groups to my family and friends.
6. I plan to write a letter to public official to increase their support of environmental protection efforts.

#### **2.4. Theories to which a sustainable consumption scale can contribute (theory development in the field of sustainable consumption).**

In this section, four social-psychological theories related to consumer behavior will be discussed: theory of reasoned action, theory of planned behavior, Schwartz norm activation theory and Sterns' value belief norm theory. Social-psychological theories of behavior change have been used in sustainability related research for many years (Jackson, 2005). Behavioral change theories and models are used to use to explain differences in individuals' behavioral patterns. These types of models and theories explain that environmental, personal, and behavioral characteristics are the major factors in subject's behavior determination (Jackson, 2005).

The behavioral change theories are commonly applied in consumerism-related disciplines such as consumer psychology, consumer behavior, and microeconomics. Each of the behavioral change theories or models use different factors to explain consumer behavior changes, such as consuming less, being environmentally responsible, and being an eco-citizen. Four representative behavioral change theories to which a sustainable

consumption scale can contribute include the theory of reasoned action, the theory of planned behavior, the Schwartz's norm activation theory, and the Stern's value belief norm theory. Each will be discussed in more detail.

#### **2.4.1. The theory of reasoned action.**

The theory of reasoned action was developed in the 1970s by Fishbein and Ajzen. This theory is built on prior research from social psychology and work on the relationship between attitude and behavior. Theory of reasoned action is a very common theory for measuring and studying social behavior; we see this theory applied in many consumption behavior/purchase intention studies (Vermeir & Verbeke, 2006; Vindigini, Janssen, & Jager, 2002).

The theory of reasoned action assumes that an individual always thinks about the consequence before performing a particular behavior. Therefore, this theory focuses on the intention factor which is a critical factor in determining individuals' behavior changes. People have positive or negative impressions towards the perception of a particular intention. In this theory, personal attitude and social pressure are considered as two critical values which shape the perceptions towards the intention and manipulate the change of behavior (Fishbein & Ajzen, 1975). This theory has been used in eco (green) related consumption intention research (Chan & Wong, 2012; Vindigini, Janssen, & Jager, 2002).

This theory is comprised of three general components: the attitude, personal norm, and behavior intention. This theory is framed on the notion that the consumer's beliefs regarding the probable outcome and evaluation of the outcome will influence the attitude of the behavior. Perceived normative behavior as inferred from the observed behavior of other people within an individual's social context results in a personal norm. Attitude of the



behavior and the personal norm will determine people's intention toward the behavior (Ajzen, 1985). Two studies from the field of food science used this theory to measure consumers' purchase intention towards organic food (Vermeir & Verbeke, 2006; Vindigini, Janssen, & Jager, 2002).

#### **2.4.2. The theory of planned behavior.**

The theory of planned behavior, developed by Ajzen in 1985, is another theoretical model used to explain social behavior. The model was developed to address the gap in understanding the connection between the attitude and behavior in the theory of reasoned action by adding a moderator, perceived behavior control, between attitude and norm.

The theory of planned behavior has been routinely applied in consumer behavior for many years. This theory also focuses on intention performance. However, the difference between this theory and the theory of reasoned action is that the factors that lead to behavioral changes are not all controlled by the individual. Therefore, perceived behavior control/self-efficiency, an individual's impression of his or her own ability to perform a demanding or challenging task, is added to this model as another determinate of performance of intention (Ajzen, 1985).

The theory of reasoned action and the theory of planned behavior are two major theories used to study human social behavior from a social psychological perspective. The researcher believes that these two theories can be adapted to the study of sustainable consumption behavior because, the researcher identified sustainable consumption as a type of social behavior. However, these two theories may not adequately explain this multi-layer sustainable concept by only explaining the consumer behavior layer.

### **2.4.3. Schwartz norm-activation theory.**

Schwartz's norm-activation theory (Schwartz, 1977) is used to understand pro-social behaviors (moral and normative dimension with the aims of benefitting others, such as thinking about the future, thinking about the environment and not jeopardizing future generations). This theory has been generally used in trying to understand and to predict people's pro-environmental behavior (e.g., minimizing the use of natural resources, minimizing the toxic emission and reducing the wastes and pollutions) (Jackson, 2005). This theory emphasizes that personal norm is the only factor that directly influences social behavior. This theory emphasizes that personal norm, the strong moral obligation, directly influences people's pro-social behavior. Therefore, the personal norm in this theory is different from the theory of reasoned action and the theory of planned action. The personal norm in this theory involves an individual's perception of social normative pressures, or relevant others' beliefs that he or she should or should not perform such behavior (Ajzen, 1985).

Schwartz (1997) believed that the causal antecedents of this personal norm are awareness of consequences and ascription of responsibility. At the same time, awareness of consequences and ascription of responsibility may also moderate the link between personal norm and behavior. This theory explains the pro-social behavior layer of sustainable consumption, but it does not include the pro-environment and sustainability aspects (Jackson, 2005).

#### **2.4.4. Stern's value belief norm theory.**

Stern's value-belief-norm (VBN) model (Stern, Dietz, Abel, Guagnano, & Kalof, 1999) is another social psychology model which has been widely used to examine and predict environmental attitudes and behavior. This model indicates that pro-social and personal morals, such as thinking about the future, considering the environment, and not jeopardizing future generations are predictors to pro-environment social behavior. It emphasizes that altruistic (concern about others) and biospheric (concern about the living environment) values to higher scores on the scales of the New Environment Paradigm (NEP). Thus, scores on the NEP correlate with awareness of consequences and ascription of responsibility. High levels of awareness and ascription of responsibility relate directly to one's personal norm, and thus, link to pro-environmental behavior (Dulap & Jones, 2002). This theory goes further by relating the norm activation theory to the ecological theory (Jackson, 2005).

#### **2.5. Review conclusion**

Sustainable apparel consumption can be defined within the context of either a macro-level perspective or a micro-level perspective. The macro-level is centered on the supply side of consumption; such research focuses on globalization, environmental policy, macro-economics, technology, life cycle assessment and ecological economics (Fuch & Lorek, 2002; Heap, Kent, & Klug, 2000; Hertwich, 2005; Kilbourne, McDonagh, & Prothero, 1997; Spaargaren, 2003; Wolff & Schönherr, 2011). The micro-level perspective is centered on the demand side of consumption. Such research focuses on behavioral economics, social-demographics, social psychology, personal lifestyle, micro-marketing, and education (Comim, Tsutsumi & Varea, 2007; Evans & Jackson, 2008; Gilg, Barr, & Ford, 2005; Haron,

Palm, & Yahaya, 2005; Hertwich, 2005; Kletzan, Köppl, Kratena, Schieicher, & Wüger, 2002; Mont, 2004; Seyfang, 2007; Vermeir & Verbeke, 2006; Vindigini, Janssen, & Jager, 2002).

To understand micro-level consumption behaviors of individuals, researchers have developed several scales to measure both attitudes and behaviors surrounding sustainable consumption. Examples include the New Environmental Paradigm scale (Dunlap et al., 2000), the Ecology scale (Maloney, Ward, & Brauch, 1975), the Environmental Concern scale (Weigel & Weigel, 1978), eco-fashion consumption (Ninimäki, 2010), and the Green Consumption scale (Gild, Barr, & Ford, 2005). No extensive scale exists to measure an individual's sustainable apparel consumption behavior throughout the apparel consumption process. Therefore, the purpose of the present research project is to develop a scale that measures a wide range of an individual's behaviors across his or her entire apparel consumption.

As identified through a literature search, pre-acquisition sustainable consumption includes behaviors during need recognition, information search, and alternative evaluation, such as deciding to use repair services rather than buying a new product or considering the longevity and durability of a product prior to making a purchase decision (e.g., Boyd & McConocha, 1996; Cluver, 2008; Harrel & McConocha, 1992; Winakor, 1969; Yurchisin & Johnson, 2010). Post-acquisition sustainable consumption includes behaviors during use, maintenance, storage, and divestment, such as mending a damaged clothing item instead of throwing it away (Fetcher, 2008) or using eco-friendly detergent and hang drying clothing (Fetcher, 2008). Furthermore, post-acquisition sustainable consumption includes behaviors that keep unwanted items out of landfills, such as selling/swapping, passing along to another,

and donating. The literature reviewed in the present research laid the groundwork for the development of a sustainable apparel consumption scale.

## CHAPTER 3 -- METHOD

### 3.1 Overview

The goal of the present research was to develop a valid and reliable scale to measure consumers' sustainable consumption within the context of apparel products. The concepts of consumption, sustainable apparel, and sustainable apparel consumption were explored. Based upon the review of literature, an operational definition of sustainable apparel consumption was developed for the purpose of the present research project.

In this study, sustainable apparel consumption is defined as a set of pro-environmental and pro-social behaviors during the pre-acquisition, acquisition, and post-acquisition stages of apparel consumption. Examples of such behaviors include the following: looking for and using information regarding sustainable apparel attributes during the pre-acquisition stage, continuing to wear or mending an apparel product that is damaged or looks worn during the post-acquisition stage, continuing to wear or altering an apparel product that does not fit during the post-acquisition stage, altering or continuing to wear an apparel item after it is no longer in fashion during the post-acquisition stage, laundering an apparel item to preserve its condition and/or to conserve energy and water during the post-acquisition stage, and re-purposing or disposing of an item in a way that prevents it from going into the garbage. Thus, to measure sustainable apparel consumption, one must measure whether a consumer engages in any of these pro-environmental and pro-social behaviors.

In this chapter, the development of a scale to measure sustainable apparel consumption will be discussed. This scale development research followed the procedures outlined by DeVellis (2003). This procedure includes the following steps:

1. Generate an item pool.
2. Determine the format for measurement.
3. Have the initial item pool reviewed by experts.
4. Consider inclusion of validation items.
5. Administer items to a development sample.
6. Evaluate the items.
7. Optimize scale length.

## **3.2 Research Design**

### **3.2.1. Item development: initial scale item generation.**

Item generation for the sustainable apparel consumption scale relied on both existing empirical referents and theoretical attributes that were identified through a review of literature. First, distinct stages in apparel consumption were identified. Second, sustainable behaviors were identified. Third, these sustainable behaviors were categorized according to which stage the behavior falls within.

To measure sustainable apparel consumption, scale items were developed to address pre-acquisition, acquisition and post-acquisition consumption stages. This is consistent with Winakor's (1969) overview of apparel consumption behavior.

#### *Measurement of sustainable behaviors.*

To measure sustainable behaviors, subjects indicated on a five-point Likert scale, ranging from "1"= never to "5"= always, the frequency with which they practice a variety of sustainable consumption behaviors within the context of apparel products. Consistent with the definition of sustainable apparel consumption, the items were developed to measure the following behaviors: looking for and using information regarding sustainable apparel

attributes during the pre-acquisition stage, continuing to wear or mending an apparel product that is damaged or looks worn during the post-acquisition stage, continuing to wear or altering an apparel product that does not fit during the post-acquisition stage, altering or continuing to wear an apparel item after it is no longer in fashion during the post-acquisition stage, laundering an apparel item to preserve its condition and/or to conserve energy and water during the post-acquisition stage, and re-purposing or disposing of an item in a way that prevents it from going into the garbage. The following Tables show initial items.

*Table 3.1. Pre-acquisition stage: Information search and evaluation*

<b>Recognition</b>	<b>Do you consider if...</b>
Information search	<p><b>When you are shopping for a product, do you look for information about...</b></p> <ul style="list-style-type: none"> <li>Product durability</li> <li>Long term fashionability</li> <li>Repairability</li> <li>Environmental impact of laundering</li> <li>Made from recycled materials</li> <li>Made from environmentally friendly materials ( i.e., recycled, renewable, organic)</li> <li>Environmentally friendly processing and production processes</li> <li>Produced in an ethical manner (for workers)?</li> <li>Resources used to ship &amp; distribute the product</li> <li>Recyclability of item</li> <li>Possible outlets for item that will extend its life</li> <li>Manufacturer or retailer commitment to the environment and/or social responsibility</li> </ul>
Alternative evaluation	<p><b>When comparing products, how important is the following information when deciding which to purchase?</b></p> <ul style="list-style-type: none"> <li>Previously used item versus new item</li> <li>Durability</li> <li>Long term fashionability</li> <li>Repair-ability</li> <li>Environmental impact of laundering</li> <li>Made from recycled materials</li> <li>Made from environmentally friendly materials (i.e., recycled, renewable, organic)</li> </ul>

*(table continues)*



Environmental impact of processing and production  
 Ethical production  
 Resources used to ship and distribute a product  
 Recyclability of item  
 Outlet for item that will extend its life  
 Probability that it will have to be thrown away when you are done with it  
 Other: manufacturer or retailer commitment to the environment and/or social responsibility

Table 3.2. Post-acquisition stage: Usage

<b>Post-acquisition</b>	<b>Do you ever do the following behavior after purchasing the product?</b>
Usage	<p>I will continue to wear a clothing item with a small hole in the fabric.</p> <p>I will continue to wear a clothing item with a medium-sized hole in the fabric.</p> <p>I will continue to wear a clothing item with a large hole in the fabric.</p> <p>If a clothing item develops a hole in the fabric to the extent that I don't want to wear it again, I keep it and use it for a different purpose (this includes either reusing the entire item as is or reusing parts of the item)</p> <p>I will continue to wear a clothing item with a small hole in the seam.</p> <p>I will continue to wear a clothing item with a medium-sized hole in the seam.</p> <p>I will continue to wear a clothing item with a large hole in the seam.</p> <p>If clothing item develops a hole in the seam to the extent that I don't want to wear it again, I keep it and use it for a different purpose (this includes either reusing the entire item as is or reusing parts of the item).</p> <p>I will continue to wear a clothing item with a missing button.</p> <p>I will continue to wear a clothing item with a broken zipper.</p> <p>I will continue to wear a clothing item with a broken snap.</p> <p>If a closure breaks on a clothing item (i.e., button or zipper or snap) to the extent that I don't want to wear it again, I keep it and use it for a different purpose (this includes either reusing the entire item as is or reusing parts of the item).</p> <p>I will continue to wear a clothing item that is too small.</p> <p style="text-align: right;"><i>(table continues)</i></p>

If clothing item becomes too small to the extent that I don't want to wear it again, I keep it and use it for a different purpose (this includes either reusing the entire item as is or reusing parts of the item).

I will continue to wear a clothing item that is too large.

If a clothing items becomes too large to the extent that I don't want to wear it again, I keep it and use it for a different purpose (this includes either reusing the entire item as is or reusing parts of the item)

I will continue to wear a clothing item that has a small amount of stains.

I will continue to wear a clothing item that has a moderate amount of stains.

I will continue to wear a clothing item that has a lot of stains.

If a clothing items becomes stained to the extent that I don't want to wear it again, I keep it and use it for a different purpose (this includes either reusing the entire item as is or reusing parts of the item)

I will continue to wear a clothing item that has faded a small amount.

I will continue to wear a clothing item that has faded a moderate amount.

I will continue to wear a clothing item that has faded a lot.

If a clothing item fades to the extent that I don't want to wear it again, I keep it and use it for a different purpose (this includes either reusing the entire item as is or reusing parts of the item)

I will continue to wear a clothing item that has pilled a small amount.

I will continue to wear a clothing item that has pilled a moderate amount.

I will continue to wear a clothing item that has pilled a lot.

If a clothing item becomes pilled to the extent that I don't want to wear it again, I keep it and use it for a different purpose (this includes either reusing the entire item as is or reusing parts of the item).

I will continue to wear a clothing item that is slightly out of fashion.

I will continue to wear a clothing item that is moderately out of fashion.

I will continue to wear a clothing item that is extremely out of fashion.

*(table continues)*

	<p>If a clothing item becomes out of fashion to the extent that I don't want to wear it again, I keep it and use it for a different purpose (this includes either reusing the entire item as is or reusing parts of the item).</p> <p>When a clothing item becomes damaged to the extent that I don't want to wear it again, I reuse the item for a different purpose (this includes either reusing the entire item as is or reusing parts of the item).</p> <p>I launder my clothing in a way that will keep my clothing in good condition.</p> <p>I launder my clothing in a way that will conserve energy.</p> <p>I launder my clothing in a way that will conserve water</p>
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*Table 3.3. Post-acquisition stage: Maintenance*

<b>Post-acquisition</b>	<b>Do you ever do the following behavior after purchasing the product?</b>
Maintenance	<p>If a clothing item develops a hole in the fabric to the extent that I don't want to wear it again, I mend it so I can wear it again.</p> <p>If a clothing item develops a hole in the seam to the extent that I don't want to wear it again, I mend it so I can wear it again</p> <p>If a closure breaks on a clothing item (i.e., button or zipper or snap) to the extent that I don't want to wear it again, I mend it so I can wear it again</p> <p>If a clothing item becomes too small to the extent that I don't want to wear it again, I alter it so that I can wear it again</p> <p>If a clothing item becomes too large to the extent that I don't want to wear it again, I alter it so that I can wear it again</p> <p>If a clothing item becomes stained to the extent that I don't want to wear it again, I take measures to remove the stain so that I can wear it again</p> <p>If a clothing item fades to the extent that I don't want to wear it again, I re-dye it</p> <p>If a clothing item becomes pilled to the extent that I don't want to wear it again, I remove the pills</p> <p>If a clothing item becomes out of fashion to the extent that I don't want to wear it again, I alter it to make it more fashionable</p> <p>I use eco-friendly laundry detergent.</p> <p>I set my washing machine to the cold water setting (instead of the warm or hot water setting) to save energy.</p> <p>I set my washing machine to the cold water setting (instead of the warm or hot water setting) to keep my clothing in good condition.</p> <p style="text-align: right;"><i>(table continues)</i></p>

I launder my clothing less frequently than most people in order to save energy and/or water.

I launder my clothing less frequently than most people in order to keep my clothing in good condition.

I hand wash my clothing in order to save energy and/or water.

I hand wash my clothing in order to keep my clothing in good condition.

I hang dry my clothing in order to save energy and/or water.

I hang dry my clothing in order to keep my clothing in good condition.

I use an energy efficient washing machine.

I use a water efficient washing machine.

I use an energy efficient clothes dryer.

I have my clothes dry cleaned.

When I have my clothes dry-cleaned, I use an eco-friendly dry cleaner.

I try to get as much use out of a clothing item as I can.

When I decide that I don't want to wear a clothing item anymore, I try to find a different way to use the item (I try to repurpose it).

When a clothing item becomes damaged to the extent that I don't want to wear it again, I try to repair the item so that I can still use it.

Table 3.4. Post –acquisition stage: Disposal

<b>Post-acquisition</b>	<b>Do you ever do the following behavior after purchasing the product?</b>
Disposal	<p>If a clothing item develops a hole in the fabric to the extent that I don't want to wear it again, I throw it away.</p> <p>If a clothing item develops a hole in the fabric to the extent that I don't want to wear it again, I give it away (give to another, sell to another, swap with another, donate, give to a recycling facility).</p> <p>If a clothing item develops a hole in the seam to the extent that I don't want to wear it again, I throw it away.</p> <p>If a clothing item develops a hole in the seam to the extent that I don't want to wear it again, I give it away (give to another, sell to another, swap with another, donate, give to a recycling facility)</p> <p>If a closure breaks on a clothing item (i.e., button or zipper or snap) to the extent that I don't want to wear it again, I throw it away.</p> <p style="text-align: right;"><i>(table continues)</i></p>

If a closure breaks on a clothing item (i.e., button or zipper or snap) to the extent that I don't want to wear it again, I give it away (give to another, sell to another, swap with another, donate, give to a recycling facility).

If a clothing item becomes too small to the extent that I don't want to wear it again, I throw it away.

If a clothing item becomes too small to the extent that I don't want to wear it again, I give it away (give to another, sell to another, swap with another, donate, and give to a recycling facility).

If a clothing item becomes too large to the extent that I don't want to wear it again, I throw it away.

If a clothing item becomes too large to the extent that I don't want to wear it again, I give it away (give to another, sell to another, swap with another, donate, and give to a recycling facility).

If a clothing item becomes stained to the extent that I don't want to wear it again, I throw it away.

If a clothing item becomes stained to the extent that I don't want to wear it again, I give it away (give to another, sell to another, swap with another, donate, give to a recycling facility)

If a clothing item fades to the extent that I don't want to wear it again, I throw it away.

If a clothing item fades to the extent that I don't want to wear it again, I give it away (give to another, sell to another, swap with another, donate, give to a recycling facility)

If a clothing item becomes pilled to the extent that I don't want to wear it again, I throw it away.

If a clothing item becomes pilled to the extent that I don't want to wear it again, I give it away (give to another, sell to another, swap with another, donate, give to a recycling facility)

If a clothing item becomes out of fashion to the extent that I don't want to wear it again, I throw it away.

If a clothing item becomes out of fashion to the extent that I don't want to wear it again, I give it away (give to another, sell to another, swap with another, donate, give to a recycling facility).

If a clothing item becomes damaged to the extent that I don't want to wear it again, I throw it away.

If a clothing item becomes damaged to the extent that I don't want to wear it again, I throw it away (give to another, sell to another, swap with another, donate, and give to a recycling facility).

*(table continues)*

When I no longer want to keep a clothing item, I throw it in the trash.  
When I no longer want to keep a clothing item, I give it away (give to another, sell to another, swap with another, donate, give to a recycling facility).  
Donate unwanted clothing to some charity organizations, such as Goodwill.  
Pass along unwanted clothes to my friends or my family  
Resell unwanted clothing products to second-hand retail store  
I rarely directly throw away my unwanted clothes  
I swap unwanted clothes with others  
Use the unwanted product for other purposes  
Re-design the unwanted products (e.g., broken jeans re-design as purse)

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### **3.2.2. Examine the content validity of the initial scale.**

In order to test the content validity of the initial draft of the measurement scale, items were independently evaluated by five experts: two sustainability directors of apparel companies, a sustainability coordinator for Oregon State University, and two professors in the School of Design and Human Environment at Oregon State University whose research focus is sustainable textiles. The evaluators were given the initially developed Sustainable Apparel Consumption scale, as well as the definitions of “sustainable apparel product” and “sustainable apparel consumption.” They were asked to provide input on the extent to which they viewed the scale as measuring sustainable apparel consumption. Based on feedback, the scale was revised. The same experts were then provided with the revised scale and instructed to provide input on whether they believed the scale was measuring the concept of sustainable apparel consumption. Based on this second round of feedback, the scale was further revised.

### **3.2.3. Examine the reliability of the initial scale.**

*Clearly conceptualizing is critical.*

In order to develop a reliable measurement of sustainable consumption, the researcher identified the attributes of the concept, sustainable consumption. After reviewing more than 70 publications and journal articles which include the concept of sustainable consumption, a content analysis was conducted for concept attributes identification. Based on the results, 14 attributes (levels) were found to be associated with sustainable consumption; however, they may or may not be all used for the final version of the sustainable apparel consumption measurement instrument. Two well-known indexes were used to define sustainable textile and apparel, the Higg Index 1.0 and the Smart Textile standard 2.0. Definitions derived from the two scales were used to shape and reconstruct the scale under development in the present research project.

*Use multiple indicators in the measurement.*

Because more indicators applied in the measurement will increase the reliability of the measurement, all identified attributes related to sustainable consumption were included to increase the reliability of the scale.

The researchers used Cronbach's alpha value as a reference to examine the internal consistency reliability of the measurement scale. Theoretically speaking, a Cronbach's alpha of 0.7 or higher is acceptable for a newly developed measurement scale; if we use a developed scale from other researchers, a Cronbach's alpha of 0.8 or higher is preferred.

### **3.3. Sample Selection**

The researcher used a purposive sample. Because the development of a scale to measure sustainable apparel consumption requires that the sample includes respondents who

represent individuals who both do and do not practice sustainable consumption behavior, it is crucial that the sample should not be homogeneous with regards to their consumption behaviors. To ensure that those practicing sustainable consumption were included, individuals belonging to one environmental group, Oregon State University Student Sustainability Initiative, were recruited for participation. Students from four major universities in the U.S. were also recruited to represent the individuals who may or may not practice sustainable apparel consumption.

### **3.4. Questionnaire administration**

Oregon State University's Institutional Review Board (IRB) approved the study on November 13, 2013. Data were collected via an online questionnaire. Participants in the four major universities were recruited through their courses' Blackboard systems. Participants were also recruited from membership within the OSU Student Sustainability Initiative (SSI). A recruitment statement and a link to the survey was distributed via the SSI newsletter. Within the email announcement, using IRB-approved language, individuals were asked to participate. The announcements explained the purpose of the web survey, the approximation of how long the survey will take, and the URL link to the web survey. If they chose to participate, they clicked on a provided link and then were directed to a webpage with the questionnaire. Before the Web survey began, informed consent forms were displayed, and the purpose of the study was explained along with their roles and rights as a participant. After they agreed with the informed consent, they were able to access the survey webpage.

The survey participants completed is shown in the Appendices and included the following scales: the proposed Sustainable Apparel Consumption Scale to measure sustainable apparel consumption behavior (Appendix A); the New Ecological Paradigm



Scale (Dunlap, et al. 2000) to test for convergent validity (Appendix B); the Intended Pro-Environment Behavior Scale (Cordano, Welcomer, & Scherer, 2003) to test for convergent validity (Appendix C); the Eco-fashion Consumption Scale (Chan and Wong , 2012) to test for predictive validity (Appendix D); and the Buying Impulsiveness Scale (Rook & Fisher, 1995) to test for discriminant validity (Appendix E). At the end of the survey, participants were asked to answer a series of demographic questions (Appendix F).

Participants completed the New Ecological Paradigm Scale, in which they indicated an individual level of environmental orientation on a 5-point Likert scale ranging from “1”=strongly disagree to “5”= strongly agree. Participants also completed the Eco-fashion Consumption Scale in which they indicated their eco-fashion consumption decision on a 5 point Likert scale ranging from “1”= never; “5”= always. Participants also completed the Intended Pro-Environment Behavior Scale in which they indicated their environmental perception on a 5-point Likert scale ranging from “1”=strongly disagree to 5= strongly agree. Finally, participants completed the Buying Impulsiveness Scale, in which they indicated their shopping values on a 5-point Likert scale ranging from “1”=strongly disagree to “5”= strongly agree

### **3.5. Data analysis**

#### **3.5.1. Item analysis.**

*Correlation.* Correlation was used to examine whether each item represented relevant aspect of sustainable apparel consumption. Any item which had lower than a 0.40 item-total correlation value was deleted (Tian, Bearden, & Hunter, 2001; Kang & Johnson, 2011), and the remaining items were used for the following exploratory factor analysis.

*Exploratory factor analysis (EFA).* The remaining items from the initial scale were tested by using exploratory factor analysis in order to examine the latent factors structure and the relationships between the observed variables (Kang & Johnson, 2011). Orthogonal varimax rotation was chosen. EFA was conducted for each aspect of sustainable apparel consumption. In the consumption stage of pre-acquisition, dimensions of information search and alternative evaluation were examined. In the consumption stage of acquisition, a point of purchase dimension was examined. In the consumption stage of post-acquisition, the dimensions of usage, maintenance and disposal were examined.

The eigenvalues and the remaining indicator' factor loadings were examined. Indicators that had less than 0.40 and had high cross-loading were eliminated. Furthermore, 0.70 was established as the minimum acceptable reliability coefficient (Hair, Anderson, Tatham & Black, 1998; Kang & Johnson, 2011).

*Confirmatory factor analysis (CFA).* CFA was used to test the factors' structure which is identified through the exploratory factor analysis (EFA). The latent factor structure and its relationship with the number of the remaining items was formulated as a numbers of factors' confirmatory factor model. *STATA 13.0* was used to test the model fit (goodness of fit, adjusted goodness of fit, comparative fit index and root mean square error of approximation).

*Pairwise correlation.* Pairwise correlation was used to further examine the measurement model fit of the SAC scales. A number of factors identified from the CFA were processed to a pair-wise correlation to examine whether each pair of factors were significantly correlated. A 100% significant correlation in the pairs was expected after this test.

### **3.5.2. Validity analysis.**

*Convergent validity.* After examination by the experts, the remaining items were gathered and accompanied by 5-point response options ranging from “1”= never to “5”= always. The sustainable apparel consumption scale was expected to have conceptual meaning similar to pre-existing scales: the Revised New Ecological Paradigm Scale (NEP) and the Pro-Environmental Behavior scale (PEB). This means that the SAC scales should have positive correlations with the chosen related constructs. Each participant was asked to answer the questions in the two pre-existing scales. Then, a pairwise correlation was applied to see whether those scales presented significant correlations with the SAC scales.

Convergent validity was examined by using Dunlap et al.’s (2000) Revised New Environmental Paradigm (NEP) scale and Pro-Environmental Behavior scale (Cordano, Welcomer, & Scherer; 2003). Since sustainable apparel consumption behaviors should be related with ecological and environmental consciousness (Dunlap et al., 2000) and intention to reduce environmental impact (Cordano et al., 2003), the SAC scales were expected to have positive correlations with these two scales to show the evidence of convergent validity. These two scales were also accompanied by 5-point scales ranging from “1”= strongly disagree to “5” =strongly agree.

*Discriminant validity.* The researcher used Rook and Fisher’s (1995) Buying Impulsiveness Scale to examine the discriminant validity of the sustainable apparel consumption scales. Buying impulsiveness was defined by Rook and Fisher (1995) as a consumer's tendency to buy spontaneously, unreflectively, immediately, and kinetically. They believed that people who act impulsively in buying are more emotionally dominated

and most of the time, without a normative evaluation orientation during their purchasing behavior.

The researcher believed that the concept, buying impulsiveness, should not be related to the concept of sustainable apparel consumption concept because sustainable consumption behaviors involve some degree of normative, socially responsible, and rational thinking.

This buying impulsiveness scale includes nine items:

1. I often buy things spontaneously.
2. “Just do it” describes the way I buy things.
3. I often buy things without thinking.
4. “I see it, I buy it” describes me.
5. “Buy now, think about it later” describes me.
6. Sometimes I feel like buying things on the spur-of-the-moment.
7. I buy things according to how I feel at the moment.
8. I carefully plan most of my purchases.
9. Sometimes I am a bit reckless about what I buy.

This measurement scale uses a 5-point Likert scale ranging from “1”=strongly disagree to “5”= strongly agree.

*Predictive validity.* To demonstrate the usefulness of the SAC scales, the predictive validity of the scales also needs to be presented. Eco-fashion consumption is a type of sustainable consumption that emphasizes actions in environmentally friendly sourcing, production, distribution and consumption (Chan & Wong, 2012; Claudio, 2007; Young et, al., 2010). Three items were included in this Eco-Fashion Consumption scale:

1. I will buy clothing that is durable.

2. I will buy clothing with recycled content.

3. I will buy clothing that is safe to the environment.

A positive correlation between the SAC scales and Eco-fashion Consumption scale can provide evidence of predictive validity (Devellis, 2003; Kang & Johnson, 2011).

Another way to further strengthen the predictive validity of the SAC scales is to pick a group of people who have specific characteristics, and predict how they will score (Neuman, 2006). The researcher invited the SSI members who identified themselves as sustainable consumers to participate the survey. This group of people were expected to get higher SAC scores than the rest of the participants. Therefore, predictive validity can be also examined if SSI groups had higher SAC scores than other participants.

## CHAPTER 4 – RESULTS

### 4.1 First Stage: Initial Scale Development

An initial questionnaire draft including a pool of 89 items was created by the researchers. The items described and reflected possible sustainable apparel consumption behaviors in three main stages: pre-acquisition, acquisition, and post-acquisition. In order to test the content validity of the initial item pool, five experts in textiles and apparel, including two sustainability directors of apparel companies, the sustainability coordinator for Oregon State University, and two professors in the School of Design and Human Environment at Oregon State University whose research focus is sustainable textiles, were invited to evaluate the questionnaire independently. All experts provided comments on improving the accuracy in word expression, adding new items, or deleting redundant items.

Based upon feedback from the experts, 26 items were dropped. Furthermore, some of the remaining items were re-worded based upon the experts' suggestions. Sixty-three items remained to represent the conceptual framework of sustainable apparel consumption. All of these items were used for statistical analysis in the process of scale purification. The revised scale included six dimensions representing the aspects of sustainable consumption: pre-acquisition apparel need recognition process (3 items); pre-acquisition information search and alternative evaluation (16 items); acquisition point of purchase (5 items); post-acquisition apparel process and usage (10 items); post-acquisition apparel maintenance (14 items); and lastly, post-acquisition apparel disposal and divestment (15 items).

### 4.2 Second Stage: Scale Purification

*Data collection procedure and results.* The survey used for this study was sent to four major universities located the Northeast, Midwest, Southeast, and Northwest of the United

States. The instructors who agreed to assist with data collection for this research posted the survey web-link to their courses' Blackboard systems and asked students to participate. Student participation was voluntary. In addition, members of Oregon State University's Student Sustainability Initiative (SSI) were invited to participate in the survey. The SSI coordinators posted the survey link on their newsletter for any interested SSI members to click the link and complete the survey. A total of 667 questionnaires were received. Eleven of them were not used due to missing values. Finally, 656 valid questionnaires were used for the data analysis. The valid questionnaires were then randomly split in half. The first set ( $n = 328$ ) was used for scale purification. The second set ( $n = 328$ ) was used for scale validation.

*Participant characteristics.* The characteristics of the sample used for scale purification showed that females were more represented (85%) than males (15%). More than 90% of the participants were under age 34. Among the participants, 78% of them declared that they were students and 20% were employed for wages. Ninety percent of the participants were U.S. citizens. Participants' environment orientation was tested by using the revised New Environment Paradigm (NEP) scale. The NEP scale is used to measure general beliefs about the relationship between human beings and the environment, and has been used for predicting people's pro-environmental behavior (Hawcroft & Milfont, 2010). The maximum score for this NEP scale is 75. Higher NEP scores reflect peoples' commitment to the preservation of natural resources and lower NEP scores indicate commitment to exploitation of natural resources. The results from this study showed that respondents had NEP scores ranging from 28 to 74. The mean NEP score was 48.60,  $SD=6.28$ . Eighty-three percent of the respondents scored higher than 45 on the NEP. This showed that the majority of the respondents indicated a pro-environmental attitude. There was no statistically significant

difference ( $t(326) = 0.67, p > 0.05$ ) for the NEP scores between the SSI members ( $M = 49.62, SD = 7.27$ ) and other respondents ( $M = 48.04, SD = 6.26$ ).

### **4.3 Initial Item Reliability Analysis**

#### **4.3.1 Item refinement by using item-total correlation.**

Item-total correlation (correlated item total correlation) was used to examine the correlation between each item and the total score of each dimension. The 12 items that had correlated item total correlation values below 0.4 were dropped. Specifically, three items in the dimension of pre-acquisition were deleted, including “When deciding whether or not to purchase an apparel item, I consider the number of times that I will be able to wear the item;” “In general, when deciding whether or not to purchase an apparel item, I consider how durable it is;” “When deciding whether or not to purchase an apparel item, I consider the length of time it will continue to be fashionable.” One item in the acquisition stage was deleted: “When I purchase clothing items at a store, I supply my own shopping bag or opt to an apparel item starts to look worn, I continue to wear it.” Three items in the maintenance dimension were dropped. The three items were: “I set my washing machine to the cold water setting (instead of the warm or hot water setting);” “I wear my clothing more than once before laundering them;” “I try to get as much use out of an apparel item as I can.” Lastly, four items were deleted from the divestment stage dimension. The four items were: “If an apparel item becomes too small or too large to the extent that I don’t want to keep it, I sell to another;” “If an apparel item starts to look worn to the extent that I don’t want to keep it, I sell to another;” “If an apparel item becomes damaged to the extent that I don’t want to keep it, I sell it to another;” and “If an apparel item becomes damaged to the extent that I don’t want to keep it, I throw it away.”



#### **4.3.2 Assessment of scale reliability.**

*EFA.* The remaining 51 items were processed in an exploratory factor analysis (EFA) with orthogonal varimax rotation to examine the dimensions of factor structure (Acock, 2013). When discussing results from EFA and CFA, the term “item” will be used in place of the previously used term “indicator.” The researchers conducted a separate EFA for each aspect of consumption, and the factors that had eigenvalues above one and whose scree-plots showed one significant “elbow” were identified as substantive important factors. A factor loading greater than 0.4 was used as a cutoff for indicator elimination (Costello & Osborne, 2005; Hair, Anderson, Tatham & Black, 1998). In addition, the indicators that had cross-loadings larger than 0.4 were deleted (Chaudhuri & Ghoshal, 2011; Hair, Anderson, Tatham, & Black, 1998; Kang & Johnson, 2011). After the exploratory factor analysis, the remaining indicators were used to assess the reliability test, and a minimum Cronbach’s alpha coefficient value of 0.7 for each latent factor was expected to be obtained.

*EFA results for pre-acquisition need recognition.* The EFA results showed that there was one factor presenting eigenvalues above 1.00. All of the three indicators’ loadings on the factor of need recognition were greater than 0.4, ranging from 0.51 to 0.73. None of them had cross-loadings greater than 0.4 and loading communalities lower than 0.3. The researchers then examined the reliability of the three indicators. The Cronbach’s alpha was 0.72, which is an acceptable reliability coefficient value for the measurement scale (see Table 4.1).

Table 4.1. EFA results for pre-acquisition need recognition

Construct	Scale items	Correlated item total correlation	Factor loading
Need recognition $\alpha = 0.72$	When I am shopping for apparel, how often do I consider whether I truly need it.	0.82	0.69
	When deciding whether or not to purchase an apparel item, how often do I consider whether I already have an item that could meet similar needs.	0.84	0.73
	When deciding whether or not to purchase an apparel item, how often do I consider whether I already have an item that could be repaired or altered to meet similar needs.	0.74	0.51

*EFA results for pre-acquisition information search and alternative evaluation.* The results of the EFA indicated that there were two factors presenting eigenvalues above 1.00 for the 13 remaining indicators. Two of the indicators had factor loadings lower than 0.4 and were eliminated (“When deciding whether or not to purchase an apparel item, I consider whether the item can be easily repaired to extend its usable life should it become damaged or worn looking” and “When deciding whether or not to purchase an apparel item, I consider whether the life cycle of the item can be prolonged after I no longer want it anymore”). One indicator at a time was removed, and the EFA was rerun. The researcher also found out that the indicator of “When deciding whether or not to purchase an apparel item, I consider the retailer’s commitment to the environment” had high cross-loading ( $>0.4$ ) on the two factors, so the researcher deleted this indicator. The ten indicators remaining were used to rerun the EFA again, and the researchers found out that five indicators were strongly loaded on the first factor that was labeled by the researchers as “environmental impact.” Three indicators

were strongly loaded on the second factor labeled as “social impact.” Two indicators were strongly loaded on the third factor which were labeled as “social and environmental commitment.” The reliability coefficient of the first factor was 0.94, the reliability coefficient of the second factor was 0.95, and the reliability coefficient of the third factor was 0.95 (see Table 4.2).

*Table 4.2. EFA results for pre-acquisition information search and alternative evaluation*

<b>Construct</b>	<b>Scale items</b>	<b>Correlated item total correlation</b>	<b>Factor loading</b>
Environmental impact $\alpha = 0.94$	When deciding whether or not to purchase an apparel item, I consider its environmental impact.	0.84	0.86
	When deciding whether or not to purchase an apparel item, I consider whether it is made of organic materials.	0.88	0.88
	When deciding whether or not to purchase an apparel item, I consider whether it is made from recycled materials.	0.87	0.91
	When deciding whether or not to purchase an apparel item, I consider whether it was made using manufacturing processes that have low environmental impact.	0.85	0.87
	When deciding whether or not to purchase an apparel item, I consider the manufacturer’s commitment to the environment.	0.81	0.84
Social impact $\alpha = 0.95$	When deciding whether or not to purchase an apparel item, I consider whether it was made in a facility that treats workers ethically.	0.90	0.92
<i>(table continues)</i>			

	When deciding whether or not to purchase an apparel item, I consider the manufacturer's commitment to ethical treatment of workers.	0.92	0.94
	When deciding whether or not to purchase an apparel item, I consider the retailer's commitment to ethical treatment of workers.	0.89	0.91
Social and environmental Commitment $\alpha = 0.95$	When deciding whether or not to purchase an apparel item, I consider the manufacturer's commitment to social and environmental campaigns/causes.	0.91	0.93
	When deciding whether or not to purchase an apparel item, I consider the retailer's commitment to social and environmental campaigns/causes.	0.91	0.93

*EFA results for acquisition at point of purchase.* There was one factor presenting an eigenvalue above 1.00 on the latent factor of point of purchase. The indicator loadings ranged from 0.52 to 0.73. The reliability coefficient value was 0.71 (see Table 4.3).

*Table 4.3 EFA results for acquisition of point of purchase*

<b>Construct</b>	<b>Scale items</b>	<b>Correlated item total correlation</b>	<b>Factor loading</b>
Point of purchase $\alpha = 0.71$	The clothing I purchase is second-hand clothing (previously used).	0.82	0.73
	The clothing I purchase is new (not previously used).	0.70	0.52
	I obtain my clothing from others in the form of hand-me-downs.	0.75	0.56
	I create re-fashioned clothing using cast-off or used clothing.	0.65	0.60

*EFA results for post-acquisition usage.* The results represented that there were two factors presenting eigenvalues above 1.00 for the factor of usage. Two indicators loaded on the first latent factor (0.64, 0.65), which presented the dimension of continued use. Seven indicators were located on the second factor, which presented the dimension of repurposes. Indicators' loadings were from 0.49 to 0.85. The reliability test with Cronbach's alpha for the first factor was 0.76; the Cronbach's alpha for the second factor was 0.87. No additional indicators needed to be eliminated at this stage (see Table 4.4).

*Table 4.4 EFA results for post-acquisition usage*

<b>Construct</b>	<b>Scale items</b>	<b>Correlated item total correlation</b>	<b>Factor loading</b>
Usage-Continued use $\alpha = .76$	Even when an apparel item becomes damaged, I continue to wear it.	0.56	0.64
	Even when an apparel item starts to look worn, I continue to wear it.	0.54	0.65
Usage-Repurpose $\alpha = .87$	Even when I think an apparel item is no longer considered fashionable by the general public, I continue to wear it.	0.59	0.50
	Even when an apparel item becomes too small, I continue to wear it.	0.64	0.49
	In general, when an apparel item becomes damaged, I use it for a different purpose.	0.78	0.77
	In general, when an apparel item starts to look worn, I use it for a different purpose.	0.78	0.85
	In general, when I think an apparel item is no longer considered fashionable by the general public, I use it for a different purpose.	0.77	0.82

*(table continues)*

In general, when an apparel item becomes too small, I use it for a different purpose.	0.76	0.79
In general, when an apparel item becomes too large, I use it for a different purpose.	0.74	0.81

*EFA results for post-acquisition maintenance.* Two factors were found within maintenance after the EFA test. Five indicators loaded on factor one which is labeled as “alteration.” Three indicators loaded on factor two which was labeled as “eco-cleaning process.” The two factors had indicators loadings from 0.66 to 0.74 and 0.54 to 0.9 respectively. Two indicators were eliminated (“If possible, I prefer hand washing my apparel items” and “If possible, I hang-dry my clothing”), since these two indicators had cross-loadings between the two factors. The first factor represented the dimension of fashion alteration, which had a reliability coefficient value of 0.84. The second factor represented the dimension of apparel eco-cleaning process, which had a reliability coefficient value of 0.82 (see Table 4.5).

Table 4.5 EFA results for post-acquisition maintenance

Construct	Scale items	Correlated item total correlation	Factor loading
Maintenance-Alteration $\alpha = .84$	I repair/mend apparel items that become damaged.	0.53	0.66
	I perform maintenance activities that improve the appearance of apparel items that start to look worn.	0.62	0.71
	I alter apparel items that are no longer in fashion.	0.6	0.74
	I alter apparel items that are too small.	0.56	0.72
	I alter apparel items that are too large.	0.62	0.71
Maintenance-Eco-cleaning process $\alpha = .82$	I use eco-friendly laundry detergent.	0.58	0.54
	I use an energy-efficient (i.e., electronic, water) washing machine.	0.58	0.9
	I use an energy-efficient clothes dryer.	0.56	0.88
	When I have my clothes dry-cleaned, I use an eco-friendly dry cleaner.	0.59	0.57

*EFA results for post-acquisition divestment.* EFA presented that there were two factors for divestment. Five indicators loaded on the first factor which is labeled as “give it away.” All five indicators entailed the consumption dimension of giving an apparel product away and had factor loadings from 0.55 to 0.82. Four indicators loaded on the second factor with factor loadings from 0.71 to 0.85. All four indicators entailed the dimension of throwing an apparel product away, which was labeled as “throw it away.” None of the indicators needed to be eliminated due to the low factor loading and cross-loading. The reliability

coefficient value for the first factor was 0.85, and the reliability coefficient for the second factor was 0.88 (see Table 4.6).

*Table 4.6. EFA results for post-acquisition divestment*

<b>Construct</b>	<b>Scale items</b>	<b>Correlated item total correlation</b>	<b>Factor loading</b>
Divestment give it away $\alpha = .85$	If an apparel item becomes too small or too large to the extent that I don't want to keep it, I give it away (i.e., give to another, swap with another, donate, give to a recycling facility).	0.63	0.73
	If an apparel item starts to look worn to the extent that I don't want to keep it, I give it away (i.e., give to another, swap with another, donate, give to a recycling facility).	0.71	0.82
	If an apparel item becomes damaged to the extent that I don't want to keep it, I give it away (i.e., give to another, swap with another, donate, give to a recycling facility).	0.64	0.64
	When I don't want to keep an apparel item because it is no longer considered fashionable by the general public, I give it away (i.e., give to another, swap with another, donate, give to a recycling facility).	0.66	0.75
	When I no longer want to keep an apparel item, I give it away (i.e., give to another, sell to another, swap with another, donate, give to a recycling facility).	0.52	0.55
Divestment throw it away $\alpha = .88$	If an apparel item becomes too small or too large to the extent that I don't want to keep it, I throw it away.	0.55	0.72
	If an apparel item starts to look worn to the extent that I don't want to keep it, I throw it away.	0.65	0.71
	If I don't want to keep an apparel item again because it is no longer considered fashionable by the general public, I throw it away.	0.61	0.85
	When I no longer want to keep an apparel item, I throw it away.	0.67	0.81



*CFA.* Confirmatory factor analysis (CFA) was conducted to test the 11-factor-model identified through the exploratory factor analysis (EFA). This 11-factor structure was examined by using *STATA 13.0*. The goodness of fit of this structure was evaluated using the root mean square error of approximation (RMSEA), comparative fit index (CFI), and Tucker-Lewis index (TLI). In general, the following criteria were used to define a satisfactory model fit: RMSEA < 0.08 and CFI and TLI values equal to or greater than 0.9 (Brown, 2003; Hair, Anderson, Tatham, & Black, 1998).

The results showed that the initial 11-factor model with 45 indicators ( $\chi^2 = 1704.622$  (764)) were below the thresholds of model fit (CFI = 0.89, TLI = 0.87, RMSEA = 0.06). Then the indicators were subjected to further analysis. All indicators in the model were significant ( $p < 0.001$ ), and all factor loadings were above 0.4. Then the researcher ran the modification indices within each indicator to find out if it was necessary to add parameters to modify the model. The researcher found out that four pairs of indicators, each pair of indicators were under the same identified factor from EFA, had high (>10) Modification indices (MI) values. In order to improve the model fit, one can either add the error terms to reduce the chi-square or delete one of the indicators in the pair to remove the error term if the two indicators in the pair described a very similar content, e.g., the indicators of “In general, when an apparel item becomes too large, I use it for a different purpose” and “In general, when an apparel item becomes too small, I use it for a different purpose.” The researcher examined the correlated item total for these pairs, and deleted the item with the lowest total correlation. For instance, “In general, when an apparel item becomes too large, I use it for a different purpose” had a lower correlated item total correlation ( $r=0.74$ ) than “In general, when an apparel item becomes too small, I use it for a different purpose” ( $r=0.76$ ), and therefore, it was deleted.

The item “I use an energy-efficient clothes dryer” was deleted because it had a lower correlated item total correlation ( $r=0.56$ ) than the item “I use an energy-efficient (i.e., electronic, water) washing machine” ( $r=0.58$ ). The item “When deciding whether or not to purchase an apparel item, I consider whether it is made from recycled materials” had a lower correlation value ( $r=0.88$ ) than “When deciding whether or not to purchase an apparel item, I consider whether it is made of organic materials” ( $r=0.87$ ), and therefore, it was deleted. The researcher also found that the items “Even when an apparel item becomes too small, I continue to wear it” and “I alter apparel items that are too small” had high MI values. The loading for the first indicator was 0.49, and this indicator was overlapping in meaning with the second indicator; therefore, the researcher eliminated the item “Even when an apparel item becomes too small, I continue to wear it.”

Seven indicators were deleted by examining the MI values. The final confirmatory model was estimated according to the remaining 38 indicators. The model fit was significantly improved ( $\chi^2 = 1220.137$  (610), CFI = 0.91, TLI = 0.90, RMSEA = 0.05). The 38 remaining indicators (see Table 4.7) represented the 11 factors of sustainable apparel consumption, and no additional items were deleted.

*Table 4.7. Sustainable apparel consumption remaining items*

<b>Construct</b>	<b>Dimension</b>	<b>Scale items</b>
Pre-acquisition	Need recognition	<p>When I am shopping for apparel, how often do I consider whether I truly need it.</p> <p>When deciding whether or not to purchase an apparel item, how often do I consider whether I already have an item that could meet similar needs.</p> <p>When deciding whether or not to purchase an apparel item, how often do I consider whether I already have an item that could be repaired or altered to meet similar needs.</p>
<b>Construct</b>	<b>Dimension</b>	<b>Scale items</b>
Pre-acquisition	Environmental impact	<p>When deciding whether or not to purchase an apparel item, I consider its environmental impact.</p> <p>When deciding whether or not to purchase an apparel item, I consider whether it is made of organic materials.</p> <p>When deciding whether or not to purchase an apparel item, I consider whether it is made from recycled materials.</p> <p>When deciding whether or not to purchase an apparel item, I consider whether it was made using manufacturing processes that have low environmental impact.</p>
<b>Construct</b>	<b>Dimension</b>	<b>Scale items</b>
Pre-acquisition	Social impact	<p>When deciding whether or not to purchase an apparel item, I consider whether it was made in a facility that treats workers ethically.</p> <p>When deciding whether or not to purchase an apparel item, I consider the manufacturer's commitment to ethical treatment of workers.</p>

*(table continues)*

<b>Construct</b>	<b>Dimension</b>	<b>Scale items</b>
Pre-acquisition	Social and environmental Commitment	<p>When deciding whether or not to purchase an apparel item, I consider the manufacturer's commitment to social and environmental campaigns/causes.</p> <p>When deciding whether or not to purchase an apparel item, I consider the retailer's commitment to social and environmental campaigns/causes.</p>

<b>Construct</b>	<b>Dimension</b>	<b>Scale items</b>
Acquisition	Point of purchase	<p>The clothing I purchase is second-hand clothing (previously used).</p> <p>The clothing I purchase is new (not previously used).</p> <p>I obtain my clothing from others in the form of hand-me-downs.</p> <p>I create re-fashioned clothing using cast-off or used clothing.</p>

<b>Construct</b>	<b>Dimension</b>	<b>Scale items</b>
Post-acquisition	Usage—continued use	<p>Even when an apparel item becomes damaged, I continue to wear it.</p> <p>Even when an apparel item starts to look worn, I continue to wear it.</p>

<b>Construct</b>	<b>Dimension</b>	<b>Scale items</b>
Post-acquisition	Usage—repurpose	<p>Even when I think an apparel item is no longer considered fashionable by the general public, I continue to wear it.</p> <p>In general, when an apparel item becomes damaged, I use it for a different purpose.</p> <p>In general, when an apparel item starts to look worn, I use it for a different purpose.</p> <p>In general, when I think an apparel item is no longer considered fashionable by the general public, I use it for a different purpose.</p> <p>In general, when an apparel item becomes too small, I use it for a different purpose.</p>

*(table continues)*

<b>Construct</b>	<b>Dimension</b>	<b>Scale items</b>
Post-acquisition	Maintenance—alteration	I alter apparel items that are no longer in fashion. I alter apparel items that are too small. I alter apparel items that are too large.

<b>Construct</b>	<b>Dimension</b>	<b>Scale items</b>
Post-acquisition	Maintenance-eco-cleaning process	I use an energy-efficient (i.e., electronic, water) washing machine. I use eco-friendly laundry detergent. When I have my clothes dry-cleaned, I use an eco-friendly dry cleaner.

<b>Construct</b>	<b>Dimension</b>	<b>Scale items</b>
Post-acquisition	Divestment—give it away	If an apparel item becomes too small or too large to the extent that I don't want to keep it, I give it away (i.e., give to another, swap with another, donate, give to a recycling facility). If an apparel item starts to look worn to the extent that I don't want to keep it, I give it away (i.e., give to another, swap with another, donate, give to a recycling facility). If an apparel item becomes damaged to the extent that I don't want to keep it, I give it away (i.e., give to another, swap with another, donate, give to a recycling facility). When I don't want to keep an apparel item because it is no longer considered fashionable by the general public, I give it away (i.e., give to another, swap with another, donate, give to a recycling facility). When I no longer want to keep an apparel item, I give it away (i.e., give to another, sell to another, swap with another, donate, give to a recycling facility).

*(table continues)*

<b>Construct</b>	<b>Dimension</b>	<b>Scale items</b>
Post-acquisition	Divestment—throw it away	<p>If an apparel item becomes too small or too large to the extent that I don't want to keep it, I throw it away.</p> <p>If an apparel item starts to look worn to the extent that I don't want to keep it, I throw it away.</p> <p>If I don't want to keep an apparel item because it is no longer considered fashionable by the general public, I throw it away.</p> <p>When I no longer want to keep an apparel item, I throw it away.</p>

#### **4.4 Third Stage: Scale Validation**

This stage examined whether the 11-factor sustainable apparel consumption scale presented a statistical valid and meaningful but distinctive construct. In order to test the validity of this scale, the researchers conducted the EFA and the CFA by using the other random sample set to test the stability of the 11-factor structure. The results were expected to meet the same thresholds in the scale purification processes. Second, the sustainable apparel consumption construct was correlated with some existing scales to test the convergent and discriminant validity. The correlation coefficient value was used in this process. Third, another existing scale was used to test predictive validity to demonstrate that the scale will have practical usage for future study.

*Participant Characteristics.* A total of 328 participants were used for the scale validation test. The demographic characteristics were very similar to the demographic characteristics of the first random group used in the scale purification. There were no significant differences in sample characteristics between the scale purification and scale validation groups. The samples in the scale validation group also presented that females were

more represented (86%) than men (14%). Ninety-eight percent of the participants were under age 34. Among the participants, 78% of them declared that they were students, and 20% of them were employed for wages. Ninety percent of the participants were U.S. citizens. All the participants had NEP scores ranged from 15 to 75,  $M=50$ ,  $SD=6.86$ . Eighty percent of the respondents scored higher than 45 on the NEP which showed that the majority of participants have a pro-environmental attitude. There was no statistically significant difference of NEP scores ( $t(326)=1.27$ ,  $p>0.05$ ) between the SSI members ( $M=52.53$ ,  $SD=7.27$ ) and the other respondents ( $M=48.54$ ,  $SD=6.24$ ).

*Item-total correlation.* The correlated item-total correlation showed that all 38 items had greater than 0.4 correlation coefficient values, and none of the items needed to be deleted.

*EFA.* The 11 factors were assessed by EFA to examine the latent factor structures. The results showed that each set of indicators belonged to a single factor (eigenvalue > 1.0). All indicators had strong factor loadings (0.47, 0.93), and no cross-loadings between the indicators were found.

*CFA.* An 11-factor measurement model with 38 indicators was estimated by using the CFA. The results presented a good model fit ( $\chi^2 = 1224.269$  (610),  $CFI = 0.92$ ,  $TLI = 0.91$ ,  $RMSEA = 0.05$ ) (See Table 4.8). All the indicators had factor loadings greater than 0.4. Since the measurement model was satisfied with the model fit, there was no additional elimination during this process.

Table 4.8. Coefficient value of the 11 factor SAC measurement model

	<b>NEED</b>	<b>EI</b>	<b>SI</b>	<b>SEC</b>	<b>PP</b>	
need1	1					
need2	1.15					
need3	0.92					
infor5		1				
infor6		0.95				
infor8		0.97				
infor10		0.98				
infor12			1			
infor13			1.01			
infor14			0.98			
infor15				1		
infor16				1.02		
pop2						1
pop3						0.47
pop4						0.98
pop5						1.25

	<b>CU</b>	<b>REP</b>	<b>ECP</b>	<b>ALT</b>	<b>GAW</b>	<b>TAW</b>
use1	1					
use2	0.81					
use3		1				
use6		2.69				
use7		2.79				
use8		2.55				
use9		2.58				
main7			1			
main11			0.93			
main13			1.22			
main3				1		
main4				0.89		
main5				0.93		
div1					1	
div3					1.16	
div5					0.99	
div7					1.03	
div15					0.87	
div9						1
div11						1.03
div12						1.09
div13						1.09

Note: NR=need recognition; EI=environmental impact; SI=social impact; SEC=social and environmental commitment; PP=point of purchase; CU=continued use; REP=repurpose; ALT=alteration; ECP=eco-cleaning process; GAW=give it away; TAW=throw it away.



The current CFA results showed that consumption stages of pre-acquisition, including the factor of need recognition (three indicators), the factor of information associated with production (four indicators), the factor of information associated with social impact (three indicators), and the factor of information associated with environmental commitment (two indicators), has an excellent model fit ( $\chi^2 = 98.1427 (48)$  , CFI = 0.99, TLI = 0.98, RMSEA = 0.06, SRMR = 0.03), which means these 12 indicators statistically represented the four aspects of sustainable apparel consumption in the pre-acquisition stage. For the 22 indicators in the post-acquisition consumption stage, the CFA also showed a statistically acceptable model fit for this post-acquisition scale ( $\chi^2 = 537.59 (194)$ , CFI = 0.91, TLI = 0.89, RMSEA = 0.07, SRMR = 0.06). This means that six factors of the post-acquisition consumption stage were statistically embodied in the dimensions of usage (two factors) , maintenance (two factors), and disposal (two factors) in the post-acquisition consumption stage. These factors included the factor of continued use (two indicators); the factor of repurpose (five indicators); the factor of eco-cleaning process (three indicators); the factor of alteration (three indicators); the factor of give it away (five indicators); and the factor of throw it away (four indicators).

*Pairwise correlation.* Pairwise correlation was applied to test whether the 11 factors, which were identified from the scale purification (see Table 4.9), were significantly correlated with each other. The results showed that within the fifty-five pairs, 84% of the factor pairs showed significant correlations and 16% of the factor pairs did not present a significant correlation value. The factor of need recognition showed significant correlation with eight factors, but it had no significant correlation with the factor of eco-cleaning process, apparel give it away and apparel throw it away. The factor of environmental impact, social impact, and social and environmental commitment were significantly correlated with all but

one factor, give it away. The factor of point of purchase and alteration significantly correlated with all 11 factors. Continued use had significant correlation with but one factor, throw it away. Repurpose was significantly correlated with but one factor, apparel give it away. Eco-cleaning process was not significantly correlated with the factor of need recognition and throw it away. The factor of give it away was significantly correlated with six factors, but was not statistically correlated with the factor of need recognition, environmental impact, social impact, environmental and social commitment and repurpose. The factor of throw it away was significantly correlated with eight factors, but was not significantly correlated with the factors of need recognition, continued use and eco-cleaning process.

Table 4.9. Pairwise correlation within eleven factors

SAC scales	NE	EI	SI	SEC	PP	CU	REP	ECP	ALT	GAW
NE	1									
EI	0.30*	1								
SI	0.22*	0.70*	1							
SEC	0.27*	0.73*	0.69*	1						
PP	0.25*	0.35*	0.26*	0.35*	1					
CU	0.18*	0.18*	0.13*	0.19*	0.40*	1				
REP	0.23*	0.36*	0.27*	0.35*	0.49*	0.32*	1			
ECP	0.06	0.44*	0.33*	0.40*	0.18*	0.18*	0.29*	1		
ALT	0.27*	0.31*	0.26*	0.35*	0.54*	0.32*	0.54*	0.23*	1	
GAW	0.10	-0.03	0.05	0.04	0.12*	0.15*	0.03	0.15*	0.12*	1
TAW	0.04	0.29*	0.18*	0.20*	0.16*	-0.05	0.22*	0.10	0.12*	0.31*

Note: NR=need recognition; EI=environmental impact; SI=social impact; SEC=social and environmental commitment; PP=point of purchase; CU=continued use; REP=repurpose; ALT=alteration; ECP=eco-cleaning process; GAW=give it away; TAW=throw it away.

\*p<0.05

*Preliminary analysis of existing scales.* Four existing scales: 1. The scale of the Revised New Environmental Paradigm (NEP) from Dunlap, VanLiere, Mertig, and Jones (2000); 2. Pro-Environmental Behavior (PEB) scale (Cordano, Welcomer, & Scherer, 2003); 3. Buying Impulsiveness (IMB) scale developed by Rook and Fisher (1995); and 4. Eco-

fashion Consumption (ECO) scale from Chan and Wong (2012) were used to examine the construct validity. The researchers first examined the reliability of each scale. Then a series of correlation were conducted to test the correlations between these four scales and 11 sustainable apparel consumption factors.

*Reliability examination.* After examining the correlated item-total correlation values, several items from the selected scales were dropped due to correlation coefficients below 0.4. Five indicators from the NEP scale were dropped (“Humans have the right to modify the natural environment to suit their needs;” “Human ingenuity will insure that we do NOT make the earth unlivable;” “The earth has plenty of natural resources if we just learn how to develop them;” “ Humans were meant to rule over the rest of nature;” and “Humans will eventually learn enough about how nature works to be able to control it”). One indicator, “The so-called ‘ecological crisis’ facing humankind has been greatly exaggerated,” had a factor loading lower than 0.4 and was deleted .One item from the IMB scale was dropped (“I carefully plan most of my purchases.”). One indicator from the ECO scale was dropped (“I will buy clothing that is durable.”). Then exploratory factor analysis was performed to examine the underlying relationship and construct of each measurement scale. The EFA results showed that the scales of IMB, PEB and ECO presented in one factor solution .

The NEP scales showed that two factors had higher than one eigenvalues, one was 3.93 and the other was 1.17. However, the scree-plot’s “elbows” showed that NEP was a one factor solution scale, even though the second eigenvalue exceeds 1.0 . The final NEP scale used for testing the convergent validity had one factor, which was represented by nine indicators (see Table 4.10). The reliability coefficient values for the NEP scale was 0.84.

*Table 4.10. NEP indicators' factor loadings*

NEP indicators	Factor loading
NEP1	0.51
NEP3	0.50
NEP5	0.60
NEP7	0.59
NEP8	0.79
NEP9	0.80
NEP11	0.60
NEP13	0.63
NEP15	0.63

Only one principle factor was found in PEB scale (eigenvalue= 3.75). All the indicators in the PEB scales were higher than 0.4 (see Table 4.11). The Cronbach's alpha for the PEB scale was 0.91.

*Table 4.11. PEB indicators' factor loadings*

PEB indicators	factor loading
PEB1	0.68
PEB2	0.86
PEB3	0.91
PEB4	0.81
PEB5	0.75
PEB6	0.71

Only one principle factor was founded in IMB scale (eigenvalue= 4.30). All the indicators in the IMB scale had over 0.4 factor loadings (see Table 4.12) and its reliability coefficient value was 0.90.

Table 4.12. IMB indicators' factor loadings

IMB indicators	IMB FACTOR
IMB1	0.67
IMB2	0.82
IMB3	0.84
IMB4	0.76
IMB5	0.75
IMB6	0.66
IMB7	0.63
IMB9	0.70

The ECO scale had one principle factor (eigenvalue= 1.07) and it had a Cronbach's alpha of 0.79. Two indicators had factor loadings of 0.73.

*Convergent validity.* The NEP and the PEB scales were used to examine the convergent validity of the SAC scales. Since the results from CFA presented that the 11-factor measurement model was statistically reliable for measuring sustainable apparel consumption, the researcher then tested all 11 SAC factors' correlation the NEP scale and the Pro-Environmental Behavior scale. Since the newly generated scales should measure something different from the knowledge attitude toward environment and intention to reduce environmental impact, the correlation coefficient value was not expected to be high.

*Table 4.13. Correlation results across SAC scales with the NEP and PEB scales*

SAC aspects	SAC dimension	NEP	PEB
Pre-acquisition	NE	0.23*	0.16*
	SI	0.14*	0.40*
	EI	0.19*	0.36*
	SEC	0.13*	0.28*
Acquisition	PP	0.14*	0.20*
Post-acquisition	CON	0.22*	0.12*
	REP	0.19*	0.28*
	ECP	0.18*	0.31*
	ALT	0.13*	0.27*
	GAW	0.29*	0.18*
	TAW	0.16*	0.02

Note: NR=need recognition; EI=environmental impact; SI=social impact; SEC=social and environmental commitment; PP=point of purchase; CU=continued use; REP=repurpose; ECP=eco-cleaning process; ALT=alteration; GAW=give it away; TAW=throw it away.  
 NEP=NEP scale; PEB=pro-environmental behavior scale  
 \*p<0.05

The results from the correlation (see Table 4.13) indicated that all dimensions in the SAC scales were significantly correlated with the NEP scale. Particularly, the four dimensions in the pre-acquisition aspect of sustainable apparel consumption, including need recognition, environmental impact, social impact, and social and environmental commitment, all had significant correlations with the NEP scale. Point of purchase in the acquisition aspect of sustainable apparel consumption had significant correlation with the NEP scale. In the post-acquisition consumption aspect, all six dimensions, including continued use, repurpose, eco-cleaning process, alteration, give it away, and throw it away, were significantly correlated with the NEP scale.

All the factors, except the factor of throw away, were significantly correlated with the PEB scale. The four dimensions in the pre-acquisition aspect of sustainable apparel consumption including need recognition, environmental impact, social impact, and social and environmental commitment all had significant correlations with the PEB scale. Point of

purchase in the acquisition aspect of sustainable apparel consumption had significant correlation with the PEB scale. In the post-acquisition consumption aspect, five dimensions were significantly correlated with the PEB scale. These dimensions were continued use, repurpose, eco-cleaning process, alteration, and give it away. This showed that the 11 SAC scales, four scales in the pre-acquisition aspect, one scale in the acquisition aspect, and six scales in the post-acquisition aspect, shared some common characteristics with the NEP scale and PEB scale. The significant correlations across the 11 dimensions of SAC scales with the NEP and PEB scales reflected that people who had more ecological and environmental consciousness (Dunlap et al., 2000) and intention to reduce environmental impact (Cordano et al., 2003) tend to practice more sustainable apparel consumption. The test results showed evidence of convergent validity for the newly generated SAC scales.

*Discriminant validity.* Buying impulsiveness was defined as a consumer's tendency to buy spontaneously, unreflectively, immediately, and kinetically (Rook & Fisher, 1995). People who act impulsively in buying are more dominated by emotions and less likely to have a normative evaluation orientation during consumption as the behaviors in sustainable consumption. Therefore, sustainable apparel consumption and buying impulsiveness are two distinct concepts, and should not be theoretically related and statistically correlated. In order to show discriminant validity of the SAC scales, the statistical results should show non-significant, negative correlations or should not show strong positive correlations with the other measurement scale (Chaudhuri, Mazumdar, & Ghoshal, 2011; DeVellis, 2003).

Three dimensions in the pre-acquisition aspect of sustainable apparel consumption (environmental impact, social impact, and social and environmental commitment) had no significant correlation with the IMB scale (see Table 4:14). The dimension of need

recognition had significant negative correlation with the IMB scale. Point of purchase in the acquisition aspect of sustainable apparel consumption had no significant correlation with the IMB scale. In the post-acquisition consumption aspect, four dimensions (continued use, repurpose, eco-cleaning process, and alteration) had no significant correlation with IMB scale; while give it away and throw it away had significant negative correlation with the IMB scale.

*Table 4.14. Correlation results between the SAC scales and IMB scale*

SAC aspects	SAC dimension	IMB
Pre-acquisition	NE	-0.32*
	SI	0.05
	EI	0.03
	SEC	0.05
Acquisition	PP	-0.04
Post-acquisition	CON	-0.07
	REP	-0.01
	ECP	0.01
	ALT	0.00
	GAW	-0.09
	TAW	-0.32*

Note: NR=need recognition; EI=environmental impact; SI=social impact; SEC=social and environmental commitment; PP=point of purchase; CU=continued use; REP=repurpose; ECP=eco-cleaning process; ALT=alteration; GAW=give it away; TAW=throw it away; IMB=impulses buying scale  
\*p<0.05

*Predictive validity.* Eco-fashion consumption was used to investigate purchasing behaviors regarding eco-friendly apparel products (Chan & Wong, 2012). Since sustainable apparel consumption includes the aspect of buying behavior regarding ecological apparel items, this scale was then expected to have a correlated relationship with sustainable apparel consumption.

The four dimensions in the pre-acquisition aspect of sustainable apparel consumption (need recognition, environmental impact, social impact, and social and environmental



commitment) all had significant correlation with the ECO scale. Point of purchase in the acquisition aspect of sustainable apparel consumption had significant correlation with the ECO scale. In the post-acquisition consumption aspect, five dimensions (continued use, repurpose, eco-cleaning process, alteration, and give it away) were significantly correlated with the ECO scale. The results showed that (see Table 4.15) ten factors were significantly correlated with eco-fashion consumption scale, except the SAC factor of throw away. This provided evidence of predictive validity of the SAC scales.

*Table 4.15. Correlation results between the SAC scales and ECO scale*

SAC aspects	SAC dimension	ECO
Pre-acquisition	NE	0.14*
	SI	0.38*
	EI	0.32*
	SEC	0.39*
Acquisition	PP	0.23*
Post-acquisition	CON	0.25*
	REP	0.25*
	ECP	0.34*
	ALT	0.29*
	GAW	0.24*
	TAW	0.05

Note: NR=need recognition; EI=environmental impact; SI=social impact; SEC=social and environmental commitment; PP=point of purchase; CU=continued use; REP=repurpose; ECP=eco-cleaning process; ALT=alteration; GAW=give it away; TAW=throw it away; ECO=eco-fashion consumption scale  
\* $p < 0.05$

In addition, comparing scores across the 11 dimensions of the SAC scale between the members from SSI and other participants (see Table 4.16), the researcher found out that the people who came from the Sustainability Student Initiative (SSI) scored significantly higher than other participants on some of sustainable apparel consumption dimensions. For instance, SSI members scored significantly higher ( $M = 9.06$ ,  $SD = 4.53$ ) than other participants ( $M = 8.18$ ,  $SD = 3.77$ ) on the scale of environment impact  $t(654) = 2.22$ ,  $p < 0.05$ ; SSI members scored significantly higher ( $M = 12.32$ ,  $SD = 4.93$ ) than other participants ( $M = 8.44$ ,  $SD = 1.91$ )

on the scale of point of purchase  $t(654)=11.22, p<0.001$ ; SSI members scored significantly higher (M=9.15, SD=3.04) than others (M= 7.98 ,SD=3.13) on the scale of alteration  $t(654)=2.11, p<0.05$ ; SSI members' converted scores were significantly higher (M=10.10, SD=4.94) than others (M=8.19, SD=3.90) on the scale of throw away. These evidences showed that the environment impact scale, the point of purchase scale, the alteration scale and the throw it away scale had predictive validity.

*Table 4.16. SSI group members and other participants score comparison*

SAC aspects	Scale	SSI	SD	other	SD	t-value	p-value
Pre-acquisition	NE	9.72	2.61	9.85	2.56	-0.28	p=ns
	EI	9.06	4.53	8.18	3.77	2.22	p<0.05
	SI	7.65	3.41	6.65	3.25	1.74	p=ns
	SEC	4.85	2.38	4.12	2.11	1.95	p=0.05
Acquisition	PP	12.32	4.93	8.44	1.91	11.22	p<0.001
Post-acquisition	CON	6.59	1.86	6.25	1.86	1.00	p=ns
	REP	13.76	4.38	12.96	4.58	0.99	p=ns
	ECP	7.65	3.33	6.92	3.05	1.33	p=ns
	ALT	9.20	3.04	7.98	3.13	2.11	p<0.05
	GAW	18.91	4.67	19.49	4.55	-0.65	p=ns
	TAW	10.1	4.94	8.19	3.90	2.74	p<0.01

Note: NR=need recognition; EI=environmental impact; SI=social impact; SEC=social and environmental commitment; PP=point of purchase; CU=continued use; REP=repurpose; ECP=eco-cleaning process; ALT=alteration; GAW=give it away; TAW=throw it away.  
 SSI=members from Sustainability student initiative; other= other participants in this study;  
 SD=standard deviation  
 ns= non-significant

## CHAPTER 5 – DISCUSSION AND IMPLICATION

The primary goal of this research was to develop a scale to measure sustainable consumption of apparel. Rather than resulting in the development of a single scale to measure sustainable apparel consumption, the present research resulted in the identification of 11 separate scales that measure different dimensions of sustainable apparel consumption. Through both EFA and CFA, scale items were reduced to 38 items that fell within 11 dimensions. Of the 11 dimensions, four include behaviors within the pre-acquisition consumption stage, one includes behaviors in the acquisition consumption stage, and six include behaviors in the post-acquisition stage. Items falling within each dimension represent a single scale of sustainable apparel consumption.

From a theoretical perspective, the 11 SAC scales cover the aspects of sustainable apparel consumption's conceptual structure. A comprehensive review of literature guided the integration of behaviors associated with sustainable consumption, attributes of sustainable apparel products, and consumption behaviors across the three stages included within Boyd and Mcconocha's (1996) Consumer Household Logistics System Model. The 11 scales of sustainable apparel consumption presented a need recognition dimension, a social impact dimension, an environmental impact dimension, and a social and environmental commitment dimension in the pre-acquisition consumption stage; point of purchase dimension in the acquisition consumption stage; continued use dimension, repurpose dimension, eco-cleaning process dimension, alteration dimension, give it away dimension, and throw it away dimension in the post-acquisition consumption stage.

Validity of the proposed 11 scales was evaluated by testing the relationship between each of the 11 dimensions and concepts included within the NEP, Pro-Environmental

Behavior, Buying impulsiveness, and Eco-Fashion Consumption scales. Results supported that sustainable apparel consumption as measured in the SAC scales has some similar characteristics with pro-environmental behavior, as well as attitude oriented towards aiming to reduce the environmental impacts and to preserve the natural resources environmental. Furthermore, the predictive validity test results showed that the SAC scales were significantly positivity correlated with the Eco-Fashion Consumption scale. This means that the SAC scales were predictable for the consumption behaviors of buying apparel product made from environmentally friendly and recycled material. The two-sample t-test results showed that people who identified themselves as sustainable consumers practiced more sustainable apparel consumption behaviors in the sustainable apparel consumption dimensions of environment impact, point of purchase, alteration, and throw it away. This also provided evidence of the predictive validity of these four SAC scales. The discriminant validity of the 11 scales was tested by using the Buying Impulsiveness scale. Results showed that nine of the SAC scales had no significant correlation with the IMB scale. This supported the notion that these SAC scales were distinct from the behaviors of buying spontaneously, unreflectively, immediately, and kinetically. The other two SAC scales, the need recognition scale and the throw it away scale had significant negative correlation with the IMB scale, thus, demonstrating that these two scales were anti-correlated with impulsive buying. This suggests that people, who shop impulsively, are less likely to consider whether they truly need to buy an apparel item to consume less and less likely to dispose unwanted apparel items appropriately, such as resale, swap with another and give to a recycling facility.

From an operational perspective, the 11 dimensions in the SAC scales clarified the behaviors associated with sustainable apparel consumption and consequently provided a

measurement scale foundation for future research. This is a major contribution of this study. The SAC scale has created a series of dimensions that can be used to measure sustainable apparel consumption behaviors in different consumption stages which will broaden opportunities for sustainability related studies. Previous studies have used existing scales to measure sustainability and its related behaviors. Some of those scales only focus on the environmental dimension of sustainability, such as the NEP scale (Dunlap, et al., 2000), Ecology scale (Maloney, Ward, & Braucht, 1975), Environmental concern scale (Weigel & Weigel, 1978), and Environment concern in apparel scale (Niinimäki and Hassi, 2011). However, this may not comprehensively cover the corporate social responsibility and some consumption dimensions, such as product disposal, environmentally friendly maintenance processes, of sustainability. For example, the Eco-Fashion Consumption scale used by Chan and Wong (2012) only has three items ( $\alpha = 0.6$ ) and just covers some aspects of pre-acquisition in consumption:

1. I will buy clothing that is durable.
2. I will buy clothing with recycled content.
3. I will buy clothing that is safe to the environment.

It might be acceptable for using this scale to quantify eco-fashion consumption, but these three items may not comprehensively reflect eco-fashion consumption, because it lacks the corporate social responsibility dimension. Overall, the SAC scales created a conceptual framework to measure sustainable apparel consumption in three main stages of consumption, pre-acquisition, acquisition and post-acquisition with 11 dimensions, including customers' need recognition, environmental impact, social impact, social and environment

commitment, point of purchase, continued use, repurpose, alteration for maintenance, eco-cleaning process, give it away, and throw it away.

For practical implications, these 11 dimensions of the SAC scale can be used by scholars and educators to develop more effective methods to research and educate people to lead them to achieve sustainable consumption. Researchers and educators can use these SAC scales to test whether taking sustainability-related courses will influence their behaviors. For example, one can have subjects complete the scale, provide them with sustainability knowledge, and then have them complete the scale again to see whether behaviors change. Furthermore, it would also be interesting for researchers to include more demographic categories and cultures, so the scale could capture more diverse social contexts. If different actions appealed among groups in different consumption dimensions, educators and environmentalists could better identify areas of focus to encourage consumers to engage in more sustainable apparel consumption. In addition, the 11 scales can be used to identify diverse sustainable consumption behaviors across various consumer groups. The educators and scholars in areas of social, consumer, and environmental science can use the scales separately to see different consumption behaviors between young and aged consumers, female and male consumers, well-educated and less-educated consumers, etc. By knowing the differences, the educators and scholars can generate methods which particularly aim at the group to change their behavior to advanced sustainable consumption.

Even though the sustainable apparel consumption measurement model had statistically acceptable measurement model fit from the results of correlation, EFA and CFA as well as convergent validity, discriminant, and predictive validity tests, using the whole model to present a single score to represent ones' sustainable apparel consumption level can

be is too general to reflect the particular sustainable consumption behaviors. One reason, from a statistical perspective, is because nine out of fifty-five scale pairs did not show significant correlation (see Table 4.9), e.g., eco-cleaning process was not significantly correlated with need recognition, ( $r(326) = 0.06, p > 0.05$ ); give it away unwanted clothes was not significantly correlated with environmental impact ( $r(326) = -0.03, p > 0.05$ ) and social impact ( $r(326) = 0.05, p > 0.05$ ). These non-significant correlations of the scales within the SAC construct may affect the measurement model's structural model fit. In addition, from a theoretical perspective, the researcher believed that people may have diverse values in the 11 scales, for instance, some people acted more sustainably at the maintenance dimension in post-acquisition consumption stage, but less sustainably at the disposal dimension; some people like to donate their unwanted clothes, but they tend to over-purchase apparel products. Therefore, in order to better differentiate, identify and categorize people's sustainable consumption behaviors, the researcher proposed using the 11 scales separately, especially if a future study wants to investigate consumption behaviors in particular dimensions or stages of consumption, such as the dimension of need recognition in the pre-acquisition consumption stage, dimension of point of purchase in the acquisition consumption stage, or the post-acquisition consumption stage.

In the results chapter, the researcher conducted tests to examine whether the 11 scales can be used separately. The current CFA results showed that the pre-acquisition consumption stage, including the scales of need recognition (3 items), information associated with production (4 items), information associated with social impact (3 items), and information associated with environmental commitment (2 items), has an excellent statistical model fit. This means that the 12 items statistically represented the four dimensions of sustainable

apparel consumption in the pre-acquisition stage. For the 22 items in the post-acquisition consumption stage, the CFA results also showed a statistically acceptable measurement model fit for this post-acquisition consumption stage; this means the six scales statistically embodied the consumption behaviors which are related with apparel usage, apparel maintenance, and apparel disposal.

The correlation results of the SAC scales with NEP and PEB scales (see Table 4.13) showed that in the pre-acquisition consumption stage, all the four SAC dimensions ( need recognition, environmental impact, social impact, and social and environment commitment) were significantly correlated with the NEP scale and PEB scale which provided the evidence of the convergent validity of the four scales represented in the pre-acquisition consumption stage. Among the four scales in the pre-acquisition aspect of sustainable apparel consumption, the scales of environmental impact, social impact, and social and environmental commitment, had no significant correlation with the IMB scale, while need recognition had significant negative correlation with the IMB scale (see Table 4.14). This provided the evidence that pre-acquisition of sustainable apparel consumption is different from impulsive buying behavior. Particularly, the significant negative correlation between the scale of need recognition and IMB scale showed that people who shop impulsively are less likely to consider whether they truly need to buy an apparel item to consume less. The correlation results between pre-acquisition consumption stage and eco-fashion consumption (see Table 4.15) showed that all four scales had positive correlations with eco-fashion consumption which provided the evidence of the predictive validity for the measurement construct of pre-acquisition consumption stage.



The correlation results of the SAC scales with the NEP and the PEB scales (see Table 4.13) showed that in the post-acquisition consumption stage, all six SAC scales (continued use, repurpose, alteration, eco-cleaning process, give it away, and throw it away) were significantly correlated with the NEP scale. Five dimensions (continued use, repurpose, alteration, eco-cleaning process, and give it away) were significantly correlated with PEB scale. This provided the evidence of the convergent validity of the scales represented in the post-acquisition consumption stage. Five scales in the post-acquisition consumption aspect (continued use, repurpose, eco-cleaning process, alteration, and give it away) had no significant correlation with IMB scale. This provided the evidence that the IMB scale was unrelated with these five scales. While the scale of throw it away had significant negative correlation with the IMB scale showed that people who had high score on IMB scale more likely had lower score on the scale of throw it away. This means that for the people who shop impulsively were less likely to dispose unwanted apparel items appropriately, such as resale, swap with another and give to a recycling facility. The correlation results between post-acquisition consumption stage and eco-fashion consumption (see Table 4.15) showed that all the six scales had positive correlations with eco-fashion consumption which provided the evidence of the predictive validity of the measurement construct of post-acquisition consumption stage.

According to the evidence of the SAC scales' model fit, convergent, discriminant and predictive validity, the researcher encourages using this SAC scales separately to investigate certain consumption behaviors in different consumption dimensions and stages. Since the 11 scales can serve as a foundation for measuring sustainable apparel consumption, future study can use this SAC scales with eleven dimensions as dependent or independent variables to

investigate more causal relationships with other behaviors, such as investigating what factors can determine SAC or what factors will be influenced by SAC. It will be interesting to look at what factors can mediate or moderate the relationship between physiological factors and sustainable apparel consumption behaviors. For instance, it will be interesting to examine whether social-economic status will moderate the relationship between perceived consumer effectiveness and the eco-cleaning process dimension of sustainable apparel consumption or whether educational background mediates the relationship between intention to practice sustainable apparel consumption and action to sustainable apparel consumption. Future studies also can use the 11 SAC scales to measure behavior and further test the theory of planned behavior, norm-activation theory, and value-believe-norm theory by examining relationships with other variables, such as environmental attitude, opportunity situation conditions, fashion leadership and ethical egoism. It would be also interesting to compare sustainable apparel consumption behaviors between different demographic groups, such as examining whether younger consumers will have lower scores on pre-acquisition sustainable apparel consumption stage or whether consumers with more education and fashion leadership characteristics have higher scores on pre-acquisition sustainable apparel consumption stage.

There are limitations for this research and some suggestions for future research. The first one is associated with the sample used in this study. Even though this study had an adequate sample size, and data were collected from multiple states, because there was no financial support for conducting this research, the participants of this study were either college students or friends and relatives of students. Demographical groups such as the population above age 40 were underrepresented. For the future research, using samples representing consumer population to do further tests are encouraged. For instance, the

researcher would like to use *Amazon Mechanical Turk*, an online marketing research digital service website, to gather data from a more diverse and global consumer sample and compare different groups' behaviors.

Another limitation is that only a small number of experts (five experts) in textile and apparel sustainability were invited to review the original item pool. Some of the items were dropped after the two rounds of expert review based on their knowledge and professional areas. The researcher believes that for future study, inviting more experts, educators and scholars with diverse backgrounds to examine items will help to improve the content validity of the measurement scale. Furthermore, the researcher also believes that inviting people who self-identify as practitioners of sustainable apparel consumption to look over the scale can also improve the content validity of the SAC scales. Gathering the comments from such consumers might increase the likelihood that all possible relevant and critical behaviors which should be represented in the SAC scales.

The third limitation associated with the validity of this scale is that during the process of statistical analysis, some items were dropped since they did not meet the statistical criteria values, e.g., in the scale purification process, item-total correlation and factor loadings should be above 0.4. Those deleted items could be also important in furthering our understanding of sustainable apparel consumption. For instance, during the scale purification process, the items of “when deciding whether or not to purchase an apparel item, I consider the number of times that I will be able to wear the item;” “In general, when deciding whether or not to purchase an apparel item, I consider how durable it is;” and “When deciding whether or not to purchase an apparel item, I consider the length of time it will continue to be fashionable,” were deleted since they had item total correlation below 0.4. The item “When deciding

whether or not to purchase an apparel item, I consider whether the item can be easily repaired to extend its usable life should it become damaged or worn looking” was deleted since it had lower than 0.4 factor loading. However, these four items represented the longevity, reparability and fashion-ability and durability aspects of apparel product and reflected the attribute of consuming fewer and efficient consumption in sustainable consumption. The researcher believes that these items should be considered for further examination, since these items described possible ways in which a consumer can practice sustainable apparel consumption and could be becoming other dimensions or other concepts in the sustainable apparel consumption scale. In addition, two items related to resale of the unwanted apparel were deleted since they had lower than 0.4 item total correlation: “If an apparel item becomes too small or too large to the extent that I don’t want to keep it, I sell to another” and “When I don’t want to keep an apparel item because it is no longer considered fashionable by the general public, I sell to another.” The researcher believes that resale could be an important component in sustainable apparel consumption, but it was not included in the SAC scales. It would be reasonable to argue that resale may belong to another dimension in the sustainable consumption or it is an individual concept. For future study, it is recommended that resale items along with longevity, reparability, fashion ability, durability of apparel products test their fit in the SAC measurement model.

As stated above, some items which might be important were dropped because they did not meet the statistical criteria, so re-examined those items is one of the suggestions to improve the development of the SAC scales. Re-wording some items to capture the broader and central meaning is another suggestion for future studies. Some items from the initial item pool might be undesirably similar to other items. This might influence participants’

responses. For instance the items of “Even when an apparel item becomes too large, I continue to wear it,” and “Even when an apparel item becomes too small, I continue to wear it.” Since some people might be more likely to continue to wear clothes when they ran bigger than smaller, or vice versa, putting these two items together might influence a participant’s answer. The researcher recommends to combined these two items to one item “Even when an apparel item becomes too large or too small, I continue to wear it” to avoid the feeling of ambiguity, so the results could catch more precise responses. The items of “In general, when an apparel item becomes too small I use it for a different purpose” and “In general, when an apparel item becomes too large I use it for a different purpose” were suspected having the issue of redundancy. The second item was deleted since it had lower item total correlation, and the covariance between these two items was really high. The reason for this might be that for most participants, when an apparel items becomes too large, they still choose to wear them instead of use it for another purpose. To better describe this consumption behavior, the researcher suggests combining these two items to one item, such as “In general, when an apparel item no longer fits my body, I use it for a different purpose.” For the items of “I use an energy efficient washing machine,” and “I use an energy efficient clothes dryer,” these two items were put together in the survey which might trigger participants’ feeling of ambiguity. Some people have a washer-dryer combo, so they might think washing machine includes the dryer when they were doing the survey. The researcher would like to reword these two items and create an item “I use an energy efficient washer-dryer” to avoid ambiguity.

In addition, rephrasing some of items in the SAC scales that did not show a significant difference between SSI groups and other participants is another suggestion for future research. The researcher believes that the lack of difference might be the result of failing to phrase the questions in a way that would adequately differentiate sustainable consumption practitioners from non-sustainable consumers. For instance, the SSI members and the other participants received very similar scores in the scale of need recognition (SSI=9.72, other=9.85). This means that there were no action differences in the need recognition dimension between sustainable consumers and other consumers, although sustainable consumers expected to have higher scores on this scale. Three items in the scale represented the attribute of consuming fewer, simplifying consumption, and doing effective consumption in sustainable consumption. These items were as follows:

1. When I am shopping for apparel, how often do I consider whether I truly need it.
2. When deciding whether or not to purchase an apparel item, how often do I consider whether I already have an item that could meet similar needs.
3. When deciding whether or not to purchase an apparel item, how often do I consider whether I already have an item that could be repaired or altered to meet similar needs.

These items encourage people to think and finally rationally behave “I will not be going to buy it if I don’t really need it” during their pre-acquisition consumption stage to avoid impulsive and over-consumption of apparel, so natural and environment costs will be automatically reduced by practicing “shopping less.” In order to make these three items more sensitive to the respondents, the researcher would like to rephrase the items as follows:

1. I buy apparel items when I truly need it

2. If I already have an item that meets similar needs, I always decide not to buy a new one.
3. I always avoid impulsive and over-apparel-consumption to reduce natural and environmental cost.

In regard to social and environmental commitment scale, the research observed another aspect of the SAC scale that merits attention. The environmental commitment scale represents the attributes of engaging in responsible and ethical behaviors in sustainable consumption. As sustainable consumer's perception of a manufacturer or a retailer's commitment to social and environmental campaigns should be one of the critical determinants in deciding to buy an item from a particular manufacturer or retailer. When shopping for apparel products, sustainable consumers will boycott the brands and retailers which produce the products through illegal and unethical systems. Giving support and loyalty to the brands and retailers that engage in social and environmental responsibility campaigns is also considered as sustainable consumption behaviors. So SSI members were expected to have higher scores than other participants in this scale. However, the results did not show that SSI members practice more advanced sustainable consumption behaviors. The researcher believes that it may be because the items in this scale did not create a specific scenario for respondents to understand these questions sufficiently well to give a commonly understood response. Without a scenario, the items might not trigger sustainable consumers to recall that they were practicing these behaviors. To make this scale more literally obvious to the sustainable consumers, the researcher suggests rephrasing the items as follows:

1. If there are options, I always choose to buy the product from the retailers or the manufactures which commit to social and environmental campaigns, e.g.,

pledging 1% of sales to the preservation and restoration of the natural environment.

2. I will boycott the product from the retailers and manufacturers that show no commitment to the society and the environment, e.g., having slave labor issues in the production supply chain.

Furthermore, as stated earlier, using a single score from these SAC scales to present an individual's sustainable apparel consumption level is problematic, since people practice sustainable apparel consumption differently, and the 11 SAC scales were not be able to cover all possible ways in which a consumer can practice sustainable apparel consumption. Therefore, to test whether the 11 scales are an adequate reflection of sustainable consumption is recommended. Further statistical analysis methods should be applied, such as proceed to test a second-order factor structure, to strengthen the results from confirmatory factor analysis (McAlexander, Schouten, & Koenig, 2002). The researcher recommends future studies to test the SAC measurement model again to see whether the 11 dimensions can be all combined to form a single concept of sustainable apparel consumption.

In addition, there is a limitation associated with the scale validation procedure. Although the random split sample was adequate when the sample size is enough (DeVellis, 2003; Kang & Johnson, 2011), applying this method might be a limitation because all samples used for scale validation answered all the 63 items instead of the 38 items identified though the scale purification. The next step of this study is to use a different sample group to validate the 38 identified items from the scale purification.

To further understand and validate the SAC scales, using other concepts to test the convergent validity is also encouraged. This study used the NEP scale and Pro-



Environmental Behavior (PEB) scale to demonstrate the convergent validity of the SAC scales. For future study, the researcher believes that Ecological Conscious Consumer Buying scale (ECCB) (Robert & Bacon, 1997; Pickett, Kangun, & Grove, 1993) can be another construct to demonstrate the convergent validity of sustainable apparel consumption scales. The Ecological Conscious Buying scale has 30-items which measures a consumer's recycling behaviors, pro-environmental dispositional behaviors, and public resources conservation behavior; it shares similar characteristics within the SAC scales. Hence, this scale is expected to be positive correlated with the SAC scales.

Use of other concepts to test the discriminant validity is another suggestion for future study. The researcher used Buying Impulsiveness scale to test the discriminant validity of the SAC scale, but did not find high positive significant correlations between the SAC scales and Buying Impulsiveness scale. This demonstrated that the concept of sustainable apparel consumption is different from the concept of impulsive buying. For future study, using other concepts to test discriminant validity of SAC scales is also recommended. Since conspicuous consumption is engaged in symbolic and visible consumption, which aims to show one's distinctive culture, social-economics and self-image (Chaudhuri, Mazumdar, & Ghoshal, 2011), using conspicuous consumption scale from Chaudhuri, Mazumdar, and Ghoshal (2011) could be an option to test the discriminant validity of the SAC scales and better differentiate the theoretical meaning of sustainable apparel consumption from other concepts.

To further test the predictive validity, the researcher encourages future studies using the scale of perceived consumer effectiveness (PCE) (Webb, Mohr, & Harris, 2007). This scale has four items:

1. What I purchase as a consumer has an effect on the nation's environment problems.

2. Each consumer's behavior can have an effect on how companies treat their employees.
3. Since one consumer can have an effect on how companies behave toward the community, it does make difference what I do.
4. Each consumer can have a positive effect on society by purchasing products sold by socially responsible companies.

Perceived consumer effectiveness is used to describe whether an individual believes that their environmentally conscious behavior will have positive influence on resolving social and environmental problem (Straughan & Roberts, 1999). Some researchers claimed that PCE was the best predictor of environmental and social responsible consumption behaviors (Antil, 1984; Roberts, 1996). Since sustainable apparel consumption represents the aspects of environmental and social responsible consumption behaviors, using the PCE scale can demonstrate the predictive validity of the three aspects, including pre-acquisition, acquisition, and post-acquisition, in the SAC scales.

The researcher found that the SAC scores from SSI members were significantly higher than other participants (see Table 4.16) in the SAC scales of environmental impact, point of purchase, apparel alteration and throw it away. These four scales might cast more weight than the other seven scales in sustainable apparel consumption. For future study, researchers may want to determine whether these four scales can be used to differentiate sustainable consumption practitioners from non-sustainable consumers. In addition, for the scales that did not show significant difference between SSI groups and other participants, future researchers may want to study why this happened. One reason could be that the descriptions of questions were too generous to be able to differentiate sustainable behaviors.

For example, in the scale of continued use, two items, “Even when an apparel item becomes damaged, I continue to wear it” and “Even when an apparel item starts to look worn, I continue to wear it,” there was no difference between the two groups even though SSI members were expected to have higher scores. To better identify the dimension of continued use, the researcher would like to specify the extent of the damage to the apparel. This can be done by adding such questions as: “I always continue to wear a clothing item, even though it has a medium-size hole in the fabric” and “I always continue to wear clothing, even though it is with missing buttons.” This result might be due to self-described sustainable consumers not actually practicing consumption behaviors such as using eco-cleaning process, repurposing unwanted apparel items and continued to use apparel items. Promoting these consumption dimensions among consumers may help to achieve advanced sustainable consumption in the future.

In conclusion, the SAC scales mark an important milestone in investigating consumer behavior relative to sustainable consumption. However, as the preceding discussion has shown, the contribution of the scale, not to mention its refinement, remains to be seen. Future researchers have numerous opportunities to utilize the framework provided by the SAC scales to explore a variety of directions. For example, researchers can use *Amazon Mechanical Turk* to gather data from a more diverse and global consumer samples and compare different groups’ behaviors on any number of SAC scale dimensions. Inviting more experts, educators and scholars as well as asking people who self-identify as practitioners of sustainable apparel consumption to examine and evaluate the SAC scales for face and content validity are encouraged. In addition, some items dropped during the statistical analysis process, e.g., “If an apparel item becomes too small or too large to the

extent that I don't want to keep it, I sell to another." "When I don't want to keep an apparel item because it is no longer considered fashionable by the general public, I sell to another" could be important in furthering our understanding of sustainable apparel consumption. Re-evaluating them, adding them in the survey and re-testing them are encouraged by the researcher. Furthermore, since the SAC scales have had relatively little refinement due their recent origin, some items might be redundant or too similar, thus, re-wording them to capture the broader and more accurate meaning is another suggestion to improve their further development. Furthermore, for future study, testing whether the 11 scales of sustainable apparel consumption are an adequate reflection of sustainable consumption is recommended. Researchers can proceed to test a second-order factor structure, to strengthen the results from confirmatory factor analysis of this study (McAlexander, Schouten & Koenig, 2002).

To better understand sustainable apparel consumption, the researcher recommends future researchers use other scales to test convergent, discriminant and predictive validity, such as using the Ecological Conscious Consumer Buying scale (ECCB) (Robert & Bacon, 1997; Pickett, Kangun, & Grove, 1993) to test the convergent validity; using the Conspicuous Consumption scale from Chaudhuri, Mazumdar, and Ghoshal (2011) to test discriminant validity and using the scale of Perceived Consumer Effectiveness (PCE) (Webb, Mohr, & Harris, 2007) to test the predictive validity of the SAC scales.

Lastly, since the sustainable consumers had significant higher scores in some scales, it will be interesting for future study to examine whether the scales of environmental impact, point of purchase, apparel alteration, and throw away scales could be more critical and cast more weight than the other seven SAC scales. The researcher also recommends to study whether some sustainable apparel consumption behaviors, such as using eco-cleaning

process, repurposing unwanted apparel items, and continued to use apparel items, are still lacking among both sustainable consumption practitioners and consumers, and whether educators and scholars should put more efforts on increasing consumer knowledge in these sustainable apparel consumption dimensions.

## Bibliography

- Acock, A. C. (2013). *Discovering Structural Equation Modeling Using Stata*: StataCorp LP.
- Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckman (Eds.), *Action-control: From cognition to behavior* (pp. 11-39). Heidelberg: Springer.
- Aldridge, A (2003). *Consumption*. Cambridge: Polity Press
- Antil, J.H.(1984). Social responsible consumers: profile and implications for public policy. *Journal of Macromarketing*, 4, 18-39.
- Barr, S., & Gilg, A. (2006). Sustainable lifestyles: Framing environmental action in and around the home. *Geogorum*, 37, 906-920.
- Belz, F.K., & Peattie, K. (2009). *Sustainability Marketing: A global perspective* (2nd ed). Glasgow: John Wiley & Sons Ltd.
- Buenstorf, G., & Cordes, C. (2008). Can sustainable consumption be learned? A model of cultural evolution. *Ecological Economics*, 67, 646-657.
- Business for Social Responsibility. (Ed.). *Overview of corporate social responsibility*. Retrieved Dec.7, 2012, from <http://www.bsr.org/BSRResources>
- Boulanger, P. M. (2010). Three strategies for sustainable consumption. *Sapiens*, 3(2), 1–10.
- Boyd, T.C., & McConcha, D.M. (1996). Consumer household materials and logistics management: Inventory ownership cycle. *The Journal of Consumer Affairs*, 30(1), 218-249.
- Briceno, T., Peters,G., Solli,C., & Hertwich, E. (2005). Using life cycle approaches to evaluate sustainable consumption programs: car-sharing. IndEcol working papers. Retrived from [http://www.ntnu.no/c/document\\_library/get\\_file?uuid=fal1c1843-44da-428f-9777-d21731c0bc19&groupId=10370](http://www.ntnu.no/c/document_library/get_file?uuid=fal1c1843-44da-428f-9777-d21731c0bc19&groupId=10370)
- Brown, P.M., & Cameron, L.D. (2000). Survey: what can be done to reduce overconsumption? *Ecological Economics*, 32(1), 27-41.
- Buenstorf, G., & Cordes, C. (2008). Can sustainable consumption be learned? A model of cultural evolution. *Ecological Economics* 67, 646–657.
- Chan, T. Y., & Wong, C.W.Y. (2012). The consumption side of sustainable fashion supply chain Understanding fashion consumer eco-fashion consumption decision *Journal of Fashion Marketing and Management* 16(2), 193-215.
- Chaudhuri, H.R., Mazumdar, S., & Ghoshal, A. (2011). Conspicuous consumption orientation: Conceptualization, scale development and validation. *Journal of consumer behavior* 10, 216-224.
- Church, C., & Lorek, S. (2007). Linking policy and practice in sustainable production and consumption: an assessment of the role of NGOs. *International Journal of Innovation and Sustainable Development*, 2(2), 230-240.
- Claudio, L. (207). Waste Couture: Environmental Impact of the Clothing Industry. *Environmental Health Perspectives*, 115 (9), 449-454.
- Cluver, B. (2008). *Consumer Clothing Inventory Management* (Doctoral dissertation). Retrieved from [http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/9507/Brigitte\\_Cluver.pdf](http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/9507/Brigitte_Cluver.pdf)

- Comim, F., Tsutsumi, R., & Varea, A. (2007). Choosing sustainable consumption: a capability perspective on indicators. *Journal of International Development*, 19, 493-509.
- Cordano, M., Welcomer, S.A., & Scherer, R.F. (2003). An analysis of the predictive validity of the new ecological paradigm scale. *Journal of Environmental Education*, 34(3), 22-28.
- Costello, A., & Osborne, J.W. (2005). Best practice in exploratory factor analysis: four recommendations for getting the most from your analysis. *Practical Assessment, Research & Evaluation*, 10 (7), 1-9.
- Defining Green Products. (2010): Air Quality Sciences. Retrieved from [http://www.aeris.org/uploads/Defining\\_Green\\_Products.pdf](http://www.aeris.org/uploads/Defining_Green_Products.pdf)
- Deschamps, M. J. (2012). *Just-style management briefing: closing the loop on recycled textiles*. Retrieved from [http://www.just-style.com/management-briefing/closing-the-loop-on-recycled-textiles\\_id113954.aspx](http://www.just-style.com/management-briefing/closing-the-loop-on-recycled-textiles_id113954.aspx)
- Devinney, T. M., Auger, P., Eckhardt, G., & Birtchnell, T. (2006). The Other CSR: Consumer Social Responsibility. Retrieved from [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=901863](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=901863)
- DeVellis, R. F. (2002). *Scale development theory and application*. Thousand Oaks, California: Sage Publications.
- Dickson, M. A., & Eckman, M. (2006). Social responsibility: The concept as defined by apparel and textile scholars. *Clothing and Textiles Research Journal*, 24(3), 178-191.
- Dickson, M., Loker, S., & Eckman, M. (2009). *Social responsibility in the global apparel industry*. New York: Fairchild Books.
- Dolan, P. (2002). The sustainability of "sustainable consumption." *Journal of Macromarketing*, 22(2), 170-181.
- Douglas, M., & Isherwood, B. (1980). *The World of Goods, Towards an Anthropology of Consumption*. London: Routledge.
- Dunlap, R. E. (2008). The new environmental paradigm scale: from marginality to worldwide use. *Journal of Environmental Education*, 40(1), 3-18.
- Dunlap, R. E., & Jones, R.E. (2002). *Environmental concern: conceptual and measurement issues*. CT: Greenwood Press.
- Dunlap, R., Van Liere, K., Mertig, A., & Jones, R. E. (2000). Measuring endorsement of the New Ecological Paradigm: A revised NEP scale. *Journal of Social Issues*, 56, 425-442.
- Engel, J.K., & Blackwell, R.D. (1982). *Consumer behavior* (4th ed). Chicago: The Dryden Press.
- Engel, J.K., Blackwell, R.D., Miniard, R.D., & Miniard, P.W. (1990). *Consumer behavior* (6th ed.). Orlando: Dryden.
- Eberle, U., Brohmann, B., & Graulich, K. (2004). Sustainable consumption needs visions. Retrieved from Institute for Applied Ecology (Öko-Institut) <http://www.oeko.de/oekodoc/224/2004-017-en.pdf>
- Ester, P., & van der Meer F. (1982). Determinants of Individual Environmental Behavior: an outline of a behavioral model and some research findings. *The Netherlands' Journal of Sociology*, 18, 57-94
- Evans, D., & Jackson, T. (2008). Sustainable consumption: perspective from social and cultural theory. Retrieved

- from <http://resolve.sustainablelifestyles.ac.uk/publications/sustainableconsumptionperspectivesfromsocialandculturaltheory>
- Fishbein, D., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: an introduction to theory and research*. Reading, MA: Addison-Wesley.
- Fletcher, K. (2008). *Sustainable fashion and textile*. London: Earthscan.
- Fuchs, D. A., & Lorek, S. (2002). Sustainable consumption governance in a globalizing world. *Global Environmental Politics*, 2(1), 19-45.
- Fuchs, D. A., & Lorek, S. (2004). Sustainable consumption political debate and actual impact. (SERI Report 1-29). Retrieved from <http://seri.at/en/economy/2009/08/19/sustainable-consumption-%E2%80%93-political-debate-and-actual-impact/>
- Gilg, A., Barr, S., & Ford, N. (2005). Green consumption or sustainable lifestyles? Identifying the sustainable consumer. *Futures*, 37, 481-504.
- George, S. (1999). The social shaping of household consumption. *Ecological Economics*, 28, 455-466.
- Ha-Brooksire, J. E., & Hodges, N.N. (2009). Socially responsible consumer behavior? Exploring used clothing donation behavior. *Clothing and Textile Research Journal* 27(3), 179-196.
- Hair, J. F., Anderson, R.E., Tatham, R.L., & Black, W.C. (1998). *Multivariate data analysis* (5th ed.). Upper Saddle River NJ: Prentice Hall.
- Hansen, U., & Schrader, U. (1997). A modern model of consumption for a sustainable society. *Journal of Consumer Policy*, 1, 443-468.
- Haron, S. A., Palm, L., & Yahaya, N. (2005). Towards sustainable consumption: an examination of environmental knowledge among Malaysians. *International Journal of Consumer Studies*, 29(5), 426-436.
- Hawcroft, L.J., & Milfont, T.L. (2010). The use (and abuse) of the new environmental paradigm scale over the last 30 years: A meta-analysis. *Journal of Environmental Psychology*, 30, 143-158
- Heap, B., Kent, J., & Klug, S.A. (2000). *Towards Sustainable Consumption: a European Perspective*. London: The Royal Society.
- Heiskanen, E., & Pantzar, M. (1997). Toward sustainable consumption: two new perspectives. *Journal of Consumer Policy*, 20, 409-442.
- Heiskanen, E., Johnson, M., Robinson, S., Vadovics, E., & Saastamoinen, M. (2009). Low-carbon communities as a context for individual behavioral change. *Energy Policy*, 38, 7586-7595.
- Hertwich, E. (2003, 19-20 May). *The seeds of sustainable consumption patterns*. Paper presented at the Society for Non-Traditional Technology, Tokyo. Abstract retrieved from [http://www.score-network.org/files/808\\_5.pdf](http://www.score-network.org/files/808_5.pdf)
- Hertwich, E.G. (2005). Life cycle approaches to sustainable consumption: a critical review. *Environment Science and Technology*, 39(13), 4673-4684.
- Hethorn, J., & Ulasewicz, C. (2008). *Sustainable Fashion: Why Now? A conversation exploring issues, practices, and possibilities*. NY: Fairchild Books.
- Hezri, A.A., & Dovers, S.R. (2006). Sustainability indicators, policy and governance: Issues for ecological economics. *Ecological Economics*, 60, 86-99.
- Hobson, K. (2002). Competing discussion of sustainable consumption: does the 'rationalization of lifestyles' make sense? *Environment Politics*, 11(2), 95-120.



- Howlett, M., Ramesh, M., & Perl, A. (2003). *Studying Public Policy: Policy Cycles and Policy Subsystems (3rd ed)*. Oxford: Oxford University Press.
- Horne, R. E. (2009). Limit to labels: the role of eco-labels in the assessment of product sustainability and routes to sustainable consumption. *Journal of Consumer Studies* 33, 175-182.
- Jackson, T. (2004). Models of Mammon: A cross-disciplinary survey in pursuit of the “sustainable consumer.” ESRC sustainable Technologies Program Working Paper Number 2004/1, center for Environment Strategy, University of Surrey,
- Jackson, T. (2005). Live better by consuming less? Is there a “double dividend” in sustainable consumption? *Journal of Industrial Ecology*, 9(1-2), 19-36.
- Jackson, T., & Michaelis, L. (2003). Policies for sustainable consumption. A Report for the UK Sustainable Development Commission, London. Retrieved from, [http://www.sd.commission.org.uk/publications/downloads/Policies\\_sust\\_consumption](http://www.sd.commission.org.uk/publications/downloads/Policies_sust_consumption).
- Jager, W. (2000). Modeling consumer behavior (Doctoral dissertation) Retrieved from University of Groningen, Groningen <http://dissertations.ub.rug.nl/faculties/gmw/2000/w.jager>
- Joergens, C. (2006). Ethical fashion: myth or future trend? *Journal of Fashion Marketing and Management*, 10, 360-371.
- Kang, M., & Johnson, K.P. (2011). Retail therapy: Scale development. *Clothing and Textiles Research Journal*, 29(1), 3-19.
- Kilbourne, W., McDonagh, P., & Prothero, A. (1997). Sustainable consumption and the quality of life: a marcomarketing challenge to the dominant social paradigm. *Journal of macromarketing*, 17(1), 4-24.
- Kletzan, D., Köppl, A., Kratena, K., Schieicher, S., & Wüger, M. (2002). Modelling sustainable consumption. From theoretical concepts to policy guidelines. *Empirica*, 29, 131-144.
- Kletzan, D., Köppl, A., Kratena, K., Schieicher, S., & Wüger, M. (2006). Towards sustainable consumption: economic modelling of mobility and heating for Austria. *Ecological Economics*, 57, 608-626.
- Kolandai-Matchett, K. (2009). Mediated communication of 'sustainable consumption' in the alternative media: a case study exploring a message framing strategy. *International Journal of Consumer Behavior*, 33, 3-125.
- Kong, N., Salzmann, O., Steger, U., & Ionescu-Somers, A. (2002). Moving business/industry towards sustainable consumption: The Role of NGOs. *European Management Journal*, 20(2), 109-127.
- Masera, D. (2001). Towards sustainable consumption in Latin America and the Caribbean. United Nations Environment Programme (UNEP). Workshop on *Sustainable Consumption for Latin America and the Caribbean*, Sao Paulo, Brazil.
- Maloney, M. P., & Ward, M. P. (1973). Ecology: let's hear from the people. An objective scale for the measurement of ecological attitudes and knowledge. *American Psychologist* 28, 583-586.
- Maloney, M. P., Ward, M. P., & Braucht, G. N. (1975). A revised scale for the measurement of ecological attitudes and knowledge. *American Psychologist*, July, 787-790.
- Maxwell, D., & Vorst, R. V. D. (2003). Developing sustainable products and services. *Journal of Cleaner Production*, 11, 883-895.

- McAlexander, J.H., Schouten, J.W., & Koenig, H.F. (2002). Building brand community. *Journal of Marketing*, 66(1), 38-54.
- McDonald, S., Oates, C., Thyne, M., Alevizou, P., & McMorland, L.A. (2009). Comparing sustainable consumption patterns across. *International Journal of Consumer Studies*, 33, 137-145.
- McLaren, D., Bullock, S., & Yousuf, N (1998). *Tomorrows' World: Britain's Share in a Sustainable World*. Earthscan, London.
- Middlemiss, L. (2008). Influencing individual sustainability: a review of the evidence on the role of community-based organizations. *International Journal of Environment and Sustainable Development*, 7(1), 78-93.
- Mont, O. (2004). Institutionalisation of sustainable consumption patterns based on shared use. *Ecological Economics*, 50, 135-153.
- Neuman, W. L. (2006). *Social research methods qualitative and quantitative Approaches* (6th eds.). Boston, MA: Pearson.
- Niinimäki, K. (2010). Eco-clothing, consumer identity and ideology. *Sustainable Development*, 18(3), 150-162
- Niinimäki, K., & Hassi, L. (2011). Emerging design strategies in sustainable production and consumption of textiles and clothing. *Journal of Cleaner Production*, 19, 1876-1883.
- Norwegian Ministry of the Environment (1994). Oslo Roundtable on Sustainable Production and Consumption. Retrieved from <http://www.iisd.ca/consume/oslo000.html>
- Nowosielski, R., Spilka, M., & Kania, A. (2007). Methodology and tools of ecodesign. *Journal of Achievements in Materials and Manufacturing Engineering*, 23(1), 91-94.
- Ochoa, L.M.C. (2011). Will 'eco-fashion' take off? A survey of potential customers of organic cotton clothes in London. Retrieved from <http://publicaciones.eafit.edu.co/index.php/administer/article/view/188#.U5JZMdhmSbU>
- O'Neill, B. C., & Chen, B. S. (2002). Demographic determinants of household energy use in the United States. *Population and Development Review*, 28, 53-88.
- Outdoor Industry Association. (2012). History of Sustainability Indexes. Retrieved from <http://outdoorindustry.org/responsibility/indexes/history.html>
- Pickett, G.M., Kangun, N., & Grove, S. J. (1993). Is there a general conserving consumer? A public policy concern. *Journal of Public Policy and Marketing*, 12, 234-243.
- Quist, J., Knot, M., Young, W., Green, K., & Vergragt, R. (2001). Strategies towards sustainable households using stakeholder workshops and scenarios. *International Journal of Sustainable Development*, 4,(1), 75-89.
- Reisch, L.A. (2001). Time and Wealth: the role of time and temporalities for sustainable patterns of consumption. *Time Society*, 10, 367-285.
- Roberts J. A. (1996). Green consumers in the 1990s: profile and implications for advertising. *Journal of Business Research*, 36, 217-31.
- Roberts, J.A. (1997). Exploring the subtle relationships between environmental concern and ecological conscious consumer behavior. *Journal of Business Research*, 40, 79-89.
- Rook, D.W., & Fisher, R.J. (1005). Normative influences on impulsive buying behavior. *Journal of Consumer Research*, 22, 305-313.
- Röpke, I. (1999). Analysis: the dynamics of willingness to consume. *Ecological Economics*, 28(3), 399-420.

- Sanne, C. (2002). Willing consumer-or locked-in? Policies for a sustainable consumption. *Ecological Economics*, 42, 273-287.
- SMART © Sustainable Textile Standard 2.0. (April. 2006). Retrieved from <http://www.sustainableproducts.com/smartweb.html>
- Schiffman, L. G., & Kanuk, L.L. (2007). *Consumer behavior* (9th ed.). Upper Saddle River, NJ: Pearson.
- Schrader, U. (2007). The moral responsibility of consumers as citizens. *International Journal of Innovation and Sustainable Development*, 2(1), 79-96.
- Schwartz, S. (1977). Normative Influences on Altruism. *Advances in Experimental Social Psychology*, 10, 222-279.
- Spaargaren, G. (2003). Sustainable consumption: a theoretical and environmental policy perspective. *Society and Natural Resources*, 16, 687-701.
- Seyfang, G. (2004). Consuming values and contested cultures: a critical analysis of the UK strategy for sustainable consumption and production. *Review of Social Economy*, 62(3), 323-338.
- Seyfang, G. (2006). Ecological citizenship and sustainable consumption: Examining local organic food networks. *Journal of Rural Studies*, 22, 383-395.
- Seyfang, G. (2007). Shopping for sustainability: can sustainable consumption promote ecological citizenship. *Environmental Politics*, 14(2), 290-306.
- Seyfang, G., & Pavvolab, J. (2008). Inequality and sustainable consumption: bridging the gaps. *Local Environment*, 13(8), 669-684.
- Solomon, M., & Rabolt, N. (2004). *Consumer Behavior in Fashion*. Englewood Cliffs, NJ Prentice Hall.
- Spaargaren, G. (2011). Sustainable consumption: A theoretical and environmental policy perspective. *Society and Natural Resources*, 16(8), 687-701.
- Spangenberg, J. H., & Lorek, S. (2002a). Environmentally sustainable household consumption: from aggregate environmental pressures to priority fields of action. *Ecological Economics*, 42(2-3), 127-140.
- Spangenberg, J. H., & Mol, P.J. A. (2008). Greening global consumption: redefining politics and authority. *Global Environmental Change* 18, 350– 359.
- Stern, P., Dietz, T., Abel, T., Guagnano, G., & Kalof, L. (1999). A Value-Belief Norm Theory of Support for Social Movements: the case of environmental concern. *Human Ecology Review*, 6, 81-97.
- Straughan, R.D., & Robert, J. A. (1999). Environmental segmentation alternatives: a look at green consumer behavior in the new millennium. *Journal of Consumer Marketing*, 16(6), 558 – 575.
- Sustainable Apparel Coalition. (2012). *The Higg Index 1.0*. Retrived from [https://www.wewear.org/assets/1/7/RyanYoung\\_SAC\\_071013.pdf](https://www.wewear.org/assets/1/7/RyanYoung_SAC_071013.pdf)
- Takase, K., Kondo, Y., & Washizu, A. (2005). An analysis of sustainable consumption by the waste input-output model. *Journal of Industrial Ecology*, 9(1-2), 201-219.
- Tian, K., T., Bearden, W.O., & Hunter, G.L. (2001). Consumers' need for uniqueness: scale development and validation. *Journal of Consumer Research*, 28, 50-66.
- Thomas, V. M., & Graedel, T.E. (2003). Research issues in sustainable consumption: toward an analytical framework for materials and the environment. *Environmental Science Technology*, 37, 5383-5388.

- The Higg Index 1.0. (June, 2012). Retrieved from Outdoor Industry Association  
<http://outdoorindustry.org/responsibility/indexes/index.html>
- UNCSD (United Nations, Commission on Sustainable Development), 1994. United Nations Commission on Sustainable Development.
- Veenhoven, R. (2004). World Database of Happiness: Continuous register of research on subjective enjoyment of life. Retrieved from the website of Erasmus University Rotterdam in the Netherlands <http://worlddatabaseofhappiness.eur.nl>.
- Vermeir, I., & Verbeke, W. (2006). Sustainable food consumption: exploring the consumer "attitude-behavioral intention" gap. *Journal of Agricultural and Environmental Ethics*, 19(2), 169-194.
- Vindigini, G., Janssen, M.A., & Jager, W. (2002). Organic food consumption a multi-theoretical framework of consumer decision making. *British Food Journal*, 104(8), 624-642.
- Von Weizsäcker, E.U. (1997). *Factor Four: Doubling Wealth, Halving Resource Use*. London: Earthscan Publications.
- Walter, S., & Weller, I. (2010). *Ecology and fashion: development lines and prospects*. Paper presented at the 2nd Global Conference, Oriel College, Oxford.
- Webb, D.J., Mohr, L.A., & Harris, K.E. (2007). A re-examination of social responsibility consumption and its measurement. *Journal of Business Research*, 61(2), 91-98.
- Weigel, R., & Weigel, J. (1978). Environmental concern the development of a measure. *Environment and Behavior*, 1(1), 3-15.
- Wiedmann, T., Minx, J., Barret, J., & Wackernagel, M. (2006). Allocating ecological footprints to final consumption categories with input-output analysis. *Ecological Economics*, 56, 28-48.
- Winakor, G. (1969). The process of clothing consumption. *Journal of Home Economics*, 61, 629-634.
- Wolff, F., & Schönherr, N. (2011). The impact evaluation of sustainable consumption. *Journal of Consumer Policy*, 34, 43-66.
- Young, W., Hwang, K., McDonald, S., & Oates, C.J. (2010). Sustainable consumption: green consumer behavior when purchasing products. *Sustainable Development*, 18 (1), 20-31.
- Yurchisin, J., & Johnson, K.P. (2010). *Fashion and the consumer*. Oxford: Berg Publishers.

## Appendices

### Appendix A: Sustainable apparel consumption scale

1. When I am shopping for apparel, how often do I consider whether I truly need it?
2. When deciding whether or not to purchase an apparel item, how often do I consider whether I already have an item that could meet similar needs?
3. When deciding whether or not to purchase an apparel item, how often do I consider whether I already have an item that could be repaired or altered to meet similar needs?
4. When deciding whether or not to purchase an apparel item, I consider the number of times that I will be able to wear the item.
5. In general, when deciding whether or not to purchase an apparel item, I consider how durable it is.
6. When deciding whether or not to purchase an apparel item, I consider whether the item can be easily repaired to extend its usable life should it become damaged or worn looking.
7. When deciding whether or not to purchase an apparel item, I consider the length of time it will continue to be fashionable.
8. When deciding whether or not to purchase an apparel item, I consider its environmental impact.
9. When deciding whether or not to purchase an apparel item, I consider whether it is made of organic materials.
10. When deciding whether or not to purchase an apparel item, I consider whether it is made from recycled materials.
11. When deciding whether or not to purchase an apparel item, I consider whether it was made using manufacturing processes that have low environmental impact.
12. When deciding whether or not to purchase an apparel item, I consider whether the life cycle of the item can be prolonged after I no longer want it anymore (i.e., I can use it for a different purpose, materials can be recycled, I can sell it, or I can pass it on to another person or organization) .
13. When deciding whether or not to purchase an apparel item, I consider the manufacturer's commitment to the environment.
14. When deciding whether or not to purchase an apparel item, I consider the retailer's commitment to the environment.
15. When deciding whether or not to purchase an apparel item, I consider whether it was made in a facility that treats workers ethically.
16. When deciding whether or not to purchase an apparel item, I consider the manufacturer's commitment to ethical treatment of workers.
17. When deciding whether or not to purchase an apparel item, I consider the retailer's commitment to ethical treatment of workers.
18. When deciding whether or not to purchase an apparel item, I consider the manufacturer's commitment to social and environmental campaigns (i.e., the campaign of Go Green, Care Our Earth, and Conserve Our Resources)
19. When deciding whether or not to purchase an apparel item, I consider retailer's commitment to social and environmental campaigns (i.e., the campaign of Go Green, Care Our Earth, and Conserve Our Resources).

20. When I purchase clothing items at a store, I supply my own shopping bag or opt to not put my items in a shopping bag (rather than use the shopping bag provided by the retailer).
21. I purchase second-hand clothing (previously used).
22. The clothing I purchase is new (not previously used).
23. I obtain my clothing from others in the form of hand-me downs.
24. I wear clothing that I created by re-fashioning cast off or used clothing.
25. Even when an apparel item becomes damaged, I continue to wear it.
26. Even when an apparel item starts to look worn, I continue to wear it.
27. Even when I think an apparel item is no longer considered fashionable by the general public, I continue to wear it.
28. Even when an apparel item becomes too small, I continue to wear it.
29. Even when an apparel item becomes too large, I continue to wear it.
30. In general, when an apparel item becomes damaged, I use it for a different purpose.
31. In general, when an apparel item starts to look worn, I use it for a different purpose.
32. In general, when I think an apparel item is no longer considered fashionable by the general public, I use it for a different purpose?
33. In general, when an apparel item becomes too small, I use it for a different purpose.
34. In general, when an apparel item becomes too large, I use it for a different purpose.
35. I repair/mend apparel items that become damaged.
36. I perform maintenance activities that improve the appearance of apparel items that start to look worn.
37. I alter apparel items that are no longer in fashion and I continue to wear it.
38. I alter apparel items that are too small and I continue to wear it.
39. I alter apparel items that are too large and I continue to wear it.
40. If possible, I prefer hand washing my apparel items.
41. I use eco-friendly laundry detergent.
42. I set my washing machine to the cold water setting (instead of the warm or hot water setting).
43. I wear my clothing more than once before laundering them.
44. If possible, I hang dry my clothing.
45. I use an energy efficient washing machine.
46. I use an energy efficient clothes dryer.
47. When I have my clothes dry-cleaned, I use an eco-friendly dry cleaner.
48. I try to get as much use out of an apparel item as I can.
49. If an apparel item becomes too small or too large to the extent that I don't want to keep it, I give it away (i.e., give to another, swap with another, donate, give to a recycling facility).
50. If an apparel item becomes too small or too large to the extent that I don't want to keep it, I sell to another.
51. If an apparel item starts to look worn to the extent that I don't want to keep it, I give it away (i.e., give to another, swap with another, donate, give to a recycling facility)
52. If an apparel item starts to look worn to the extent that I don't want to keep it, I sell to another.
53. If an apparel item becomes damaged to the extent that I don't want to keep it, I give it away (i.e., give to another, swap with another, donate, give to a recycling facility).
54. If an apparel item becomes damaged to the extent that I don't want to keep it, I sell to another.

55. When I don't want to keep an apparel item because it is no longer considered fashionable by the general public, I give it away (i.e., give to another, swap with another, donate, give to a recycling facility).

56. When I don't want to keep an apparel item because it is no longer considered fashionable by the general public, I sell to another.

57. If an apparel item becomes too small or too large to the extent that I don't want to keep it, I throw it away.

58. If an apparel item becomes damaged to the extent that I don't want to keep it, I throw it away.

59. If an apparel item starts to look worn to the extent that I don't want to keep it, I throw it away.

60. If I don't want to keep an apparel item because it is no longer considered fashionable by the general public, I throw it away.

61. When I no longer want to keep an apparel item, I throw it away.

62. When I no longer want to keep an apparel item, I compost it.

63. When I no longer want to keep an apparel item, I give it away (i.e., give to another, sell to another, swap with another, donate, give to a recycling facility).

Note: 5-point scale 1=Never, 5=Always

## **Appendix B: Revised New Environmental Paradigm (NEP) Scale Items**

(Dunlap, VanLiere, Mertig & Jones, 2000)

1. We are approaching the limit of the number of people the earth can support.
2. Humans have the right to modify the natural environment to suit their needs.
3. When humans interfere with nature it often produces disastrous consequences.
4. Human ingenuity will insure that we do NOT make the earth unlivable.
5. Humans are severely abusing the environment.
6. The earth has plenty of natural resources if we just learn how to develop them.
7. Plants and animals have as much right as humans to exist.
8. The balance of nature is strong enough to cope with the impact of modern industrial nations.
9. Despite our special abilities humans are still subject to the laws of nature.
10. The so-called "ecological crisis" facing humankind has been greatly exaggerated.
11. The earth is like a spaceship with very limited room and resources.
12. Humans were meant to rule over the rest of nature.
13. The balance of nature is very delicate and easily upset.
14. Humans will eventually learn enough about how nature works to be able to control it.
15. If things continue on their present course, we will soon experience a major ecological catastrophe.

Note: Five point scale "1"=Strongly disagree, "5"=Strongly agree

## **Appendix C: Pro-environmental behavior scale**

Cordano, Welcomer, and Scherer (2003)

1. I would sign a petition to support stricter environmental laws.
2. I would participate in a protest against a company that is harming the environment.
3. I would participate in protests against current environmental conditions.
4. I plan to participate in events organized by environmental groups.
5. I would distribute information published by environmental groups to my family and friends.
6. I plan to write a letter to public official to increase their support of environmental protection efforts.

Note: 5-point scale "1"=Strongly disagree, "5"=Strongly agree

## **Appendix D: Eco-fashion consumption scale**

Chan and Wong (2012)

1. I will buy clothing that is durable.
2. I will buy clothing with recycled content.
3. I will buy clothing that is safe to the environment.

Note: 5-point scale "1"=Strongly disagree, "5"=Strongly agree



### **Appendix E: Buying impulsiveness scale**

Rook and Fisher (1995)

1. I often buy things spontaneously.
2. Just do it" describes the way I buy things
3. I often buy things without thinking.
4. I see it, I buy it" describes me.
5. Buy now, think about it later" describes me.
6. Sometimes I feel like buying things on the spur-of-the-moment.
7. I buy things according to how I feel at the moment
8. I carefully plan most of my purchases.
9. Sometimes I am a bit reckless about what I buy.

Note: 5-point scale "1"=Strongly disagree, "5"=Strongly agree

## **Appendix F: Demographic questions**

Are you a current member of Student Sustainability Initiative?

Yes

No

What is your gender?

Male

Female

No response

What is your age range?

21 and Under

22 to 34

35 to 44

45 to 54

55 to 64

65 and Over

Employment Status: Are you currently...?

Employed for wages

Self-employed

Out of work

A homemaker

A student

Retired

Unable to work

5. What is the highest degree or level of schooling you have completed? If currently enrolled, mark the previous grade or highest degree received.

Elementary school

Middle school

High school

Associates degree

Bachelor's degree

Graduate degree

## Appendix G: IRB Notification of Exemption



STUDY ID  
5774

Notification Type	<b>EXEMPTION</b>		
Date of Notification	11/1/2013		
Study Title	Development of a Scale to Measure Sustainable Apparel Consumption		
Principal Investigator	Brigitte Cluver		
Study Team Members	Ruirui Zhang, Leslie Burns		
Submission Type	Project Revision		
Level	Exempt	Category(ies)	2
Number of Participants	1500 <i>Do not exceed this number without prior IRB approval</i>		
Funding Source	None	Proposal #	N/A
PI on Grant or Contract	N/A		

The above referenced study was reviewed by the OSU Institutional Review Board (IRB) and determined to be exempt from full board review.

**Expiration Date: 05/21/2018**

*The exemption is valid for 5 years from the date of approval.*

Annual renewals will not be required. If the research extends beyond the expiration date, the Investigator must request a new exemption. Investigators should submit a final report to the IRB if the project is completed prior to the 5 year term.

### Documents included in this review:

- |   |   |  |
|---|---|--|
| <input checked="" type="checkbox"/> Protocol      | <input type="checkbox"/> Recruiting tools               | <input type="checkbox"/> External IRB approvals        |
| <input checked="" type="checkbox"/> Consent forms | <input checked="" type="checkbox"/> Test instruments    | <input type="checkbox"/> Translated documents          |
| <input type="checkbox"/> Assent forms             | <input type="checkbox"/> Attachment A: Radiation        | <input type="checkbox"/> Attachment B: Human materials |
| <input type="checkbox"/> Alternative consent      | <input type="checkbox"/> Alternative assent             | <input type="checkbox"/> Grant/contract                |
| <input type="checkbox"/> Letters of support       | <input checked="" type="checkbox"/> Project revision(s) | <input type="checkbox"/> Other:                        |

**Comments:** Changed subject population; included compensation for students.

### Principal Investigator responsibilities:

- Amendments to this study must be submitted to the IRB for review prior to initiating the change. Amendments may include, but are not limited to, changes in funding, personnel, target enrollment, study population, study instruments, consent documents, recruitment material, sites of research, etc.
- All study team members should be kept informed of the status of the research.
- Reports of unanticipated problems involving risks to participants or others must be submitted to the IRB within three calendar days.
- The Principal Investigator is required to securely store all study related documents on the OSU campus for a minimum of three years post study termination.