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Perceptions of medical professionals towards sustainability orientation and acceptability of eco-friendly medical scrubs

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Perceptions of Medical Professionals towards Sustainability Orientation and acceptability of
Eco-Friendly Medical Scrubs

by

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Thesis

Submitted to the School of Technology Studies

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in partial fulfillment of the requirements

for the degree of

MASTERS OF SCIENCE

in

Fashion Merchandising

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ABSTRACT

This research explores the perceptions of medical professionals towards sustainability orientation and acceptability of eco-friendly medical scrubs. This study examines the correlation between sustainability orientation and scrub properties as a means of finding the perceptions of medical professionals on the mentioned topic. Also, gender, department of medical professional, their age and work experience, and the price of the eco-friendly scrubs were considered as factors affecting the correlation. This study included surveying the medical professionals who used scrubs as uniforms, by distributing questionnaires and analyzing responses using SPSS. Results showed that as sustainability orientation increases, medical professionals give less importance to properties of scrubs. Gender and department of hospital they work in affects the correlation. Professionals with greater age and work experience are more sustainably oriented with greater acceptability of eco-friendly scrubs. And the majority of the medical professionals who participated in the study agreed to pay a higher price for the eco-friendly medical scrubs.

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Chapter 1: Introduction

In recent years, issues of environmental protection in the apparel industry have received increased attention, with apparel firms implementing a variety of eco-conscious initiatives throughout their supply chains.

Associated with the manufacturing process are arrays of negative environmental consequences, including decreased air, soil and water quality, decreased bio-diversity, increased emissions of greenhouse gases, depleted water sources and other renewable resources, and reduced non-renewable resources. So the negative environmental effects of apparel and textile manufacturing are also indirect environmental effects of apparel consumption (Connell 2011). The environmental concerns related to solid waste are multi-faceted and include issues such as release of toxins into water and soil and degradation of land. Apparel consumption is an environmentally significant behavior and a contributing cause of environmental change. So development of a socially responsible apparel industry requires the encouragement of eco-conscious consumption behavior among consumers (Connell 2011).

Introduction to scrubs

The use of scrubs began in operating room setting around 1900 and was preceded by surgical cap and gown (Belkin 1997). Scrubs are the most simple designs in which the design is purely utilitarian. They are a design that has not changed in years: unisex, reversible, rugged fabric, single color, with a drawstring waist. They are sold almost exclusively to medical professionals and used most often in critical care facilities (Aagard 2008). Since the turn of the century, clothing known as surgical scrub apparel has been worn by health care personnel in the operating room setting. Today, a wide variety of this

type of apparel is being used for many applications in health care outside the operating room. Surgical scrubs are worn by a variety of medical professionals in various capacities all over the world (Aagard 2008). Once only white, they are now found in variety of colors and patterns and with different material compositions (Aagard 2008). So a scrub revolution later took place that included changes in color, design, and materials. The fabric selected possessed a number of desirable characteristics like wrinkle resistance, easy care property, and extended durability (Belkin 1997).

The different ways and purposes for which the scrubs are worn are in the operating room, as uniforms and as personal protective equipment (Belkin 1997). Scrubs help to improve the patients' perceptions and preferences of their health care providers as professionals or patients' abilities to distinguish among departments and disciplines in the health care setting (Belkin 1997). Medical supply companies are becoming more and more adventurous with their fit and cut while hospitals are getting more free with when and where scrubs may be worn and the colors that can be worn (Aagard 2008).

In order to bring yet another change or innovation to the product that already exists in the market, it is important to know what the end-users think about the change we are planning to make.

Today, as sustainability is an important issue that is given prime consideration in all the fields, introduction of this GREEN concept in medical garments makes a stimulating topic to research.

Different ways in which Eco-Friendly medical scrubs are manufactured are:

- 1) **Uniforms made from recycled polyester and organic cotton:** Uniforms from organic cotton (refers to organically grown cotton using crop rotation, beneficial insects, compost, and other farming methods in place of chemical fertilizers and intensive farming techniques) and recycled polyester allow men and women in occupational fields that may not always be so chemically free to dress themselves and surround their bodies in organic and eco-friendly fabrics (Konkler 2009).
- 2) **Scrubs made from bamboo and cotton:** Eco-friendly medical scrubs made from bamboo have been introduced by Amazing Tee's of Tucson, Arizona USA, which specializes in eco-friendly apparel, particularly organic sustainable bamboo and organic cotton. Bamboo fabric is particularly appropriate for the medical profession because of its natural antibacterial properties. Further, the bamboo scrubs are highly absorbent, wicking moisture from the skin, are strong and durable while also soft and silky, and are easy to wash and do not wrinkle (Bamboo medical scrubs introduced, Medical Textiles, 2011)

- Organic cotton background

The popularity of organic cotton apparel is growing every year as consumers, whose appetites have been whetted with organic foods, are seeking to expand their organic lifestyle to include apparel. Sales of products made from organic cotton, the most widely available organic fiber, have jumped to \$1.06 billion in 2006, and apparel manufacturers and retailers, eager to capture a piece of this growing consumer segment, have been producing organic textiles and apparel every budget (Hustvedt & Dickson, 2008). Certified organic cotton is described as “grown according to established standards, which prohibit the use of toxic and persistent

agro-chemicals, as well as GM organisms.” Standard cotton farming causes substantial environmental problems and is responsible for 11% of world’s pesticide consumption (Goworek 2011).

Organic Cotton Consumers:

Consumers of organic cotton apparel also labeled for social and processing claims may be influenced by a variety of beliefs and attitudes. If organic apparel is framed as an environmental issue, than concern for environment may be an important psychographic variable. A study of consumers for blended organic cotton apparel, garments that contain less than 100 percent organic cotton, found that consumers willing to consider moderate percentage blends (45-70) in their purchase decisions did not differ demographically from consumers whom organic cotton content was not a determinant attribute (Hustvedt & Dickson, 2008).

Chapter 2: Background Information

Globalization has made it possible to produce clothing at increasingly lower prices, which has made consumers think that clothing is easily disposable. This is called ‘Fast Fashion’, the clothing equivalent to fast food. But this fast fashion leaves pollution footprint with each step of clothing life cycle, generating potentially environmental and occupational hazards. Polyester the most widely used fiber is made from petroleum. With the rise in production in the fashion industry, demand for the manmade fibers has nearly doubled in the last 15 years. The manufacture of polyester and other synthetic fabrics is an energy intensive process requiring large amount of crude oil and releasing large amount of chemicals including volatile organic compounds, particulate matter, and acid

gases such as hydrogen chloride, all of which can cause or aggravate respiratory disease. Annually, 4.5 million tons of clothing and footwear are produced in USA, and only 1.25 million tons of post-consumer textiles are recovered for next use. One of the obstacles for reusing, and recycling materials from post-consumer clothing is that, most of the apparels are made from more than one material and constructed with many permanent junctions using stitches and adhesives (Gam, Cao, Cheryl, & Heine, 2009).

Healthcare is the second leading contributor to waste in the United States (Gifty, Gabriel, & Makary, 2011). 6600 tons of medical waste is generated by US healthcare industry everyday (Simpson 2010). Hospitals should play a vital role within their community in helping to identify and address environmental threats to health, and in ensuring that all aspects of community life contribute to creation of physical and social environmental supportive of health. They should not only meet the highest standards of conventional environmental responsibility, but they should also strive to be more ecologically sustainable. They should practice 3Rs of reducing, recycling, and re-using their wastes, and move to a zero emissions policy. Hospitals have a responsibility to advocate for, and ensure health promoting physical and social environments in the community. This will mean engaging in issues such as the health impact of urban design, environmental impact of industrial activity, and resource extraction, or environmental and social sustainability of economic development (Hancock 1999).

Cotton one of the most popular and versatile fibers used in clothing manufacture, also has a significant environmental footprint. U.S. is the largest exporter of cotton in the world as per USDA. This crop accounts for quarter of all pesticides used in the U.S. According to the Recycling of Low Grade Clothing Waste, a September 2006 report by

consultant Oakdene & Hollins, once bought, an estimated 21% of the annual clothing purchases stay in the home increasing the stocks of clothing, and other textiles held by the consumers. This report calls it stock piling, an increase in the “national wardrobe”, which is considered to represent a potentially large quantity of latent waste that will eventually enter the solid waste.

Prior to consumers acquiring, and using apparel, manufacturing occurs. So associated with manufacturing, there are a number of negative environmental consequences which include, decreased soil, water, and air quality, decreased biodiversity, increased greenhouse emissions, depleted water sources, and other renewable resources, and reduced non-renewable resources (Connell 2011). The environmental effects of apparel consumption are a result of two primary factors. The first being, pollution, and solid waste generated as consumers use, care for, and discard apparel. Research suggests that, for some apparel products, dry cleaning, and home laundry may result in more environmental harm than the life cycle stage of apparel (Connell 2011). And the second major way being, the consumption of apparel industry directly contributes to environmental change by depleting the natural resources (Connell 2011). Ethical issues in the clothing industry relate mainly to, environmental, and social sustainability, principally the use of pesticides, volume of clothing consumption, working conditions for manufacturers’ employees, and disposal of used garments (Gowerek 2011). Apparel industry is the major contributor to environmental problems from textile material manufacturing, as apparel manufacturing contributes to landfills. The production of cotton can cause major environmental damage since a large quantity of pesticides, fertilizers, and defoliant are used in cotton fields. In 1999, cotton was the second most

heavily pesticide sprayed crop with approximately 81 million pounds of pesticide applied to upland cotton in USA (Gam, Cao, Cheryl, & Heine, 2009).

The journey of a piece of clothing doesn't necessarily end in the landfill. A portion of clothing purchases are recycled mainly in three ways, clothing may be resold by the primary consumer to other consumers at a lower price, it may be exported in bulk for sale in developing countries, or it may be chemically or mechanically recycled into raw material for the manufacture of other apparel and non-apparel products. To address the environmental impact of fast fashion and its source, and to find a niche in this increasingly competitive market, some manufacturers are aiming to develop "eco-fashions." The International Standard Organization has defined eco-fashions as, "identifying the general environmental performance of a product within a product group based on its whole lifecycle in order to contribute to improvements in key environmental measures, and to support sustainable consumption patterns (Waste couture: environmental," 2007). The 5 green recommendations for surgical practices were identified as, operating room waste reduction, and segregation, reprocessing of single use medical devices, environmentally preferable purchasing, energy consumption management, and pharmaceutical waste management (Gifty, Gabriel, & Makary, 2011). The council for Textile Recycling estimates that 2.5billion pounds of post-consumer textile waste is thus collected, and prevented from directly entering the landfills. According to trailspace.com, an outdoor gear information site, recycling cotton saves 20,000 liters of water per-kilogram of cotton, a water intensive crop (Waste couture: environmental," 2007). The practices of going green in the hospitals also include use of environmental preferable purchasing of products and services in all the departments.

Environmental preferable purchasing is the “act of purchasing products and services whose environmental impacts have been considered less harmful or damaging than that compared to competing products/services (Gifty, Gabriel, & Makary, 2011).

So as cotton and polyester are the major fibers used in manufacturing scrubs (“Studio scrubs – Eco-friendly”, 2009), all the sustainability issues pertaining to cotton and polyester will imply to scrubs as well. As a result, sustainability is an important issue to be considered while purchasing the scrubs. In recent years, there has been growing interest to ensure that business and industry behaves in an environmentally responsible manner. This includes not polluting the environment, using resources in a sustainable manner, and avoiding harm to the eco-system health and bio-diversity. There are many ways in which hospitals may contribute to environmental damage. Among the most obvious ones are their use of energy and other resources, their emissions of carbon dioxide, and toxic chemicals, their production of solid and liquid wastes, and other environmentally harmful practices (Hancock 1999).

Chapter 3: Purpose of the Study

This study is aimed at determining the perceptions of medical professionals and medical staff towards sustainability orientation and their acceptance of eco-friendly medical scrubs. The information garnered from this study would be useful for the apparel manufacturers and distributors to focus a new target market as the topic of sustainability and eco consciousness is of prime importance today.

Chapter 4: Justification and significance

In United States, healthcare services generate over 3 million tons of solid waste per year (Jameton & Pierce, 2001). Health services also pose unique problems including the use of pharmaceutical and biological products with complex manufacturing processes, environmentally significant precursors, and potentially toxic bodily by products of medications, as well as complex and hazardous solid, air, and water emissions, including toxic, infectious, and radioactive wastes (Jameton & Pierce, 2001). The declining condition of natural environment is beginning to affect the health of population in many parts of the world. As a result, healthcare professionals and organizations need to consider long-term environmental cost of providing healthcare, and to reduce the material and energy consumption of the healthcare industry (Jameton & Pierce, 2001).

In recent years, issues of environmental protection in apparel industry have received increased attention, with apparel firms implementing a variety of eco-conscious initiatives throughout the supply chain (Connell 2011) As manufacturers of healthcare products and devices have a corporate and social responsibility to reduce the amount of waste their products contribute to landfills, hospital executives have much more “green” product choices that existed few years ago (Simpson 2010). Also, savvy hospitals have initiated “green ness” as their marketing advantage, especially in geographies where a heightened environmental awareness prevails (Simpson 2010). The environmental impact of healthcare and the puzzle of sustainability raise ethical questions regarding healthcare’s environmental stewardship. Concern for health of earth’s ecosystem suggests that health care institutions, and practitioners should reassess their practices in order to

soften or eliminate harmful effects (Jameton & Pierce, 2001). The field of environmental ethics has grown extensively, but with little attention to medicine and healthcare. It is time for environmental ethics and medical ethics to reopen a dialogue, and seek an ethically appropriate balance between immediate individual health needs and sustainability (Jameton & Pierce, 2001). So, today a new-concept of “cradle to cradle” contrary to the traditional “cradle to grave” has been adopted in order to avoid materials from entering the waste and polluting after their use. Instead they can again be reused and the material cycle continues (Gam, Cao, Cheryl, & Heine, 2009).

Every nurse when considers her responsibility to the society as a whole, ecofriendly nurse executives can act as a link between the hospitals, and communities in which they operate and thus help in promoting green projects (Simpson 2010). Nursing led reduce / reuse / recycle efforts can help in keeping these waste out of landfills, and thus these planet friendly efforts can improve community’s opinion about the hospitals, strengthening loyalty, and advocacy for the facility (Simpson 2010). Health care professionals can offer leadership both in devising environmentally sound health care practices, and in articulating the principles of sustainable health. Health care professionals need to include environmental care among their primary ethical obligations and will thus have to become actively involved in ethical debates in concern to balance the environmentally responsible healthcare with clinical services (Jameton & Pierce, 2001).

As scrubs are the most important and basic medical clothing used by all medical professionals, consumption of the scrubs is also on a larger scale and so is its disposal. So now, with sustainability being a major concern, the introduction of eco-friendly medical

scrubs would contribute towards this future step, and facilitate in the disposal process of medical garments.

Chapter 5: Research objectives

- 1) To empirically measure the perceptions of medical professionals towards sustainability and their acceptability of eco-friendly medical scrubs.
- 2) To what extent does gender and department moderate the relation between the sustainability orientation and the acceptability of the Eco-friendly medical scrubs.

Chapter 6: Research Questions

- 1) What is the correlation between sustainability orientation and acceptability of eco-friendly medical scrubs?
- 2) How does gender moderate the correlation between sustainability orientation and acceptability of eco-friendly medical scrubs?
- 3) How does department of medical professionals they work in affect the correlation between the sustainability orientation and acceptability of eco-friendly medical scrubs?
- 4) How does age and work experience affect the correlation between the sustainability orientation and acceptability of eco-friendly medical scrubs?
- 5) How does the price of the scrub affect the correlation between sustainability orientation and acceptability of eco-friendly medical scrubs?

Chapter 7: Objective of Study

This study is aimed at determining the perceptions of the medical professionals towards sustainability orientation and their acceptability of eco-friendly medical scrubs.

Chapter 8: Literature Review

Before researching on the perceptions of medical professionals regarding sustainability and their acceptability of eco-friendly medical scrubs, it was important to investigate previous' studies done on similar lines. From the literature search, it was evident that all the studies done till date, were related to the perceptions or attitudes of patients regarding, nursing or surgeon's attire. Most of the literature concerned nurses' and patients' perceptions of traditional and non-traditional attire in different settings and did not focus on what nurses considered professional attire (Newton & Chaney, 1996).

In today's healthcare institutions, many other types of health care providers wear white uniform that was once nurses' province. A recent trend for nurses is to wear "scrub suits" in settings such as intensive care units and emergency rooms. This attire is expedient, clean, and comfortable for nurses working in these high techs, high stress settings (Newton & Chaney, 1996). Physicians have been aware that their appearance influences physician patient relationship. A strong association between physician physical appearance and patient's initial perceptions of physician competence has been documented (Keenum, Wallace, & Stevens, 2003). White uniforms have historically represented the registered nurse. With present interdisciplinary approaches to care planning and delivery, patients have confusion in identifying which of the healthcare team is actually a registered nurse (Carlee, Peterson, Grubaugh, Mastropietro, & Schoettle, 1999). The public prefers attire that differs with the role of nurse. In hospital setting, patient and families choose nurses dressed in white uniform with caps. In the teaching or counseling settings, patients and families preferred street clothes with a laboratory coat because they believed that nurse was more approachable in this attire.

When nurses gave care, patients believed they looked more competent and professional, and were more easily identified in white uniform with cap (Newton & Chaney, 1996). Surgeons began to wear all white garments in the operating room, including white coats, to protect the patient, and surgeon from contamination. White was chosen because it is a symbol of power and purity (Major, Hayase, Balderrama, & Lefor, 2005). A carefully dressed physician might convey a message that patient's contact is an important event and that it takes time to prepare for it, whereas the unkempt physician might be perceived as uncaring and aloof (Keenum, Wallace, & Stevens, 2003). During the last century, white coat had become the most widely recognized symbol of physician. Its origins are based in the laboratory and operative suite (Major, Hayase, Balderrama, & Lefor, 2005). Now, about the uniforms for nurses, nurses from the Victorian era wore uniforms that reflected the neat and clean nightingale image with a tradition stemming from military and religious origins. Historically, nurses have worn distinctive uniforms usually white, which have facilitated patient identification, and portrayed a neat and clean image. Additionally, nurses' caps were worn to denote a place of training and to aid in nurse identification (Carlee, Peterson, Grubaugh, Mastropietro, & Schoettle, 1999). Nursing uniforms have changed significantly during past 12 years. Loose fitting white, colored, and patterned scrubs with tennis shoes or clogs have replaced the fitted white dress, white leather shoes, and nursing school cap that were used previously. Dresses and skirts have become less common, and short smock jackets have replaced long laboratory coats (Albert, Wocial, Meyer, & Trochelman, 2007). Nursing uniforms were initially developed to instill a sense of power within the profession. But in today's healthcare environment, what reflects power has shifted causing nurse executives to step out of

nursing uniform into business attire (Fay & Karen, 2006). Nursing uniform has long been a source of struggle between group identity and individuality, and management and staff. Some argue that uniform is simply an outdated relic of history, while others see it as essential professional respect and patients' satisfaction (Carlee, Peterson, Grubaugh, Mastropietro, & Schoettle, 1999). Nurses' appearance affects interactions with family members and may shape patient family perceptions of nurse's profession and image. Additionally, non-standardization of uniform color in a single unit or throughout the hospital may increase difficulty in differentiating nurses from other hospital personnel (Albert, Wocial, Meyer, & Trochelman, 2007).

Some of the studies that were conducted were based on the following:

- To examine patients' perceptions and attitudes towards various aspects of male and female physician's professional appearance in family practice setting (Keenum, Wallace, & Stevens, 2003).
- A study to evaluate attitudes of patients, physicians, and non-hospitalized public toward the attire of their surgical care givers (Major, Hayase, Balderrama, & Lefor, 2005).
- To explore the effect that current nursing attire has on the image of nursing profession (Carlee, Peterson, Grubaugh, Mastropietro, & Schoettle, 1999).
- To determine what image is conveyed to patients by different nurse uniforms (Carlee, Peterson, Grubaugh, Mastropietro, & Schoettle, 1999).
- To determine if nurse uniform style and color affected perceptions of nurse professionalism based on 5 nurse image traits in pediatric subjects and 10 nurse image traits in adult subjects (Albert, Wocial, Meyer, & Trochelman, 2007).

- To identify specific concerns of faculty about professional attire based on their clinical observation of staff and students, and to compare student and faculty perceptions of professional attire, and examined faculty's influence on students' perceptions about professional attire (Newton & Chaney, 1996).

Based on the literature search till date, studies have been conducted to understand patients' attitudes and perceptions about the dress-code for physicians or healthcare professionals. But studies have not been conducted to understand the perceptions of health care professionals and staff about the dress or uniform they wear. This study is aimed at determining the perceptions of health-care staff about their acceptability of eco-friendly medical scrubs, a new product in healthcare apparel line.

Chapter 9: Methodology

- **Study design**

Correlation, because when the perceptions of population are tested, conclusions are in terms of a correlation study between perceptions about sustainability and acceptability of eco-friendly scrubs.

- **Sampling**

The population for the study was medical professionals from multi-specialty hospitals in the near-by areas of Ypsilanti like Ann-arbor and Novi. Sample was the staff from different departments of hospital who use scrubs. And the sampling technique used was purposive random sampling because questionnaires were distributed to staff of different departments from the hospitals, at random.

- **Measurement**

Data was gathered through questionnaires which were handed out to the medical staff. The questionnaires consisted of a likert type scale, with scale points ranging from Strongly Agree (5 = Highest rating) to Strongly Disagree (1 = Lowest rating) and other scale points ranging from Very Often (5 = Highest Rating) to Never (1 = Lowest Rating). An Alpha test of reliability was applied to the data after the questionnaires were collected.

- **Reliability of both scales**

Table 1: Values of reliability of both scales

Cronbach's Alpha	N of Items
.841	5

From the reliability statistics, it can be seen that the alpha value of scales used for survey in the study is 0.841, which means the scales are 84.1% reliable. So the reliability of scales used for study is on the higher side, which makes the results even more justifiable.

- **Measures to insure safety and confidentiality for human and animal subjects**

The questionnaires were distributed by a person who was not associated with the thesis and the responses from hospital staff were also received in sealed envelopes.

- **Data analysis**

SPSS software was used for analyzing the data. The statistical procedure used was correlation (Regression) analysis.

Chapter 10: Results and discussion

I. Correlation between sustainability orientation and scrub properties

Table 2, Correlation co-efficient and sigma values for sustainability orientation and scrub properties

	Sustainability Orientation & Scrub Properties
Correlation coefficient	
Pearson Correlation coefficient	-0.341
Sigma (2-Tailed)	0.000 (< 0.05)

Sustainability orientation and scrub properties are negatively correlated by a factor of 0.341, which is a moderate correlation. As the value of Sigma (two-tailed) is below 0.05, correlation between the two variables is significant. So, as sustainability orientations increases, the value of properties of scrubs decreases, which implies that as the respondents' orientation towards sustainability increases, they are willing to compromise on the properties of scrubs and eco-friendly is the most important property that they expect from scrubs. This is a relevant and logical correlation between the two variables.

II. Pearson Correlation coefficient between sustainability orientation and scrub properties for price

Table 3, Correlation co-efficient and sigma values for sustainability orientation and scrub properties for price

	Sustainability Orientation	Scrub Properties
Pearson Correlation coefficient for Price	0.516	-0.514

SP6 is a variable for the price of scrub. And, it is positively co-related to sustainability orientation by a factor of 0.516, which is a high correlation. As the value of Sigma (two-tailed) is below 0.05, the Correlation between two variables is significant. So as the price of scrub increases, the sustainability orientation also increases, which implies that, respondents who are oriented towards sustainability are willing to pay more for eco-friendly medical scrubs.

The variable, price of the scrub has negative correlation with properties of the scrub by a factor of 0.504, which is a high correlation and significant as well, as the value of sigma (two-tailed) is below 0.05. So, as the price of the scrub increases, other scrub properties have less importance. This implies that respondents who are willing to pay more for the eco-friendly scrubs, are not concerned about other properties of scrubs like color, fitting, comfort, and type of material.

III. Correlation between the two variables in males and females

The total numbers of respondents for survey were 102.

Males:

Table 4, Correlation co-efficient and sigma values for correlation in males

	Males
Pearson Correlation coefficient	0.081
Sigma (2-Tailed)	0.729 (>0.05)

Out of the total respondents, the numbers of males were 21.

In males, correlation between the sustainability orientation and scrub properties is positive by a factor of 0.081, which is very low and is not statistically significant as the sigma value is much greater than 0.05. Here as the correlation is positive, male respondents are sustainably oriented and scrub properties also are important to them. But, males are minority in population and correlation between the two variables in males is not significant.

Females

Table 5, Correlation co-efficient and sigma values for correlation in males

	Females
Pearson Correlation coefficient	-0.374
Sigma (2-Tailed)	0.001 (<0.05)

In Females, the correlation between sustainability orientation and scrub properties is negative by a factor of 0.374, which is a moderate correlation and also is statistically significant as the sigma value is less than 0.05. Here the correlation is negative, so with increase in sustainability

orientation, scrub properties are of less importance to female respondents which implies that eco-friendly property of scrubs is more important to female respondents than other properties in scrubs. Thus, gender does moderate the relationship between the two variables.

IV. Department-wise Correlation

The two departments under study were Rehab, and ICU department. Here the differences in correlation of variables between the two departments were compared. Also whether price of the scrub affects respondents' attitude towards eco-friendly scrubs was taken into consideration for the two departments.

Rehab

Table 6, Correlation co-efficient and sigma values for correlation in rehab department

	Sustainability Orientation & Scrub Properties	SP6 (Price)
Pearson Correlation coefficient	-0.117	0.514
Sigma (2-Tailed)	0.364 (>0.05)	0.000 (<0.05)

For the rehab department, sustainability orientation and scrub properties are negatively co-related by a factor of 0.117, which is a very low correlation and the sigma value being more than 0.05, the correlation is not significant. So it can be concluded that respondents from rehab department, who are sustainably oriented are willing to accept the eco-friendly scrubs by conceding on other properties of scrubs. But, the correlation is on the lower side and not significant as well.

Here the respondents of rehab department have a positive correlation between the price of scrub and sustainability orientation by a factor of 0.514, which is a higher correlation and is statistically significant as the value of sigma is below 0.05. So the respondents who are oriented towards sustainability are willing to pay more for the eco-friendly scrubs.

And the price of the scrubs has a negative correlation with scrub properties by a factor 0.312, which is a moderate correlation and is statistically significant as sigma is below 0.05, which implies that people who are willing to pay more for eco-friendly scrubs, are not concerned about the properties of the scrubs.

ICU

Table 7, Correlation co-efficient and sigma values for correlation in ICU department:

	Sustainability Orientation & Scrub Properties	SP6 (Price)
Pearson Correlation coefficient	-0.421	0.464
Sigma (2-Tailed)	0.007 (<0.05)	0.003 (<0.05)

For the ICU department, sustainability orientation and scrub properties are negatively correlated by a factor of 0.421, which is a very high correlation and the sigma value is less than 0.05, which means the correlation is significant. So it can be concluded that respondents from ICU department, who are sustainably oriented are willing to accept the eco-friendly scrubs by conceding on other properties of scrubs.

But, the price of scrub has a positive correlation with sustainability orientation by a factor of 0.464, which is a higher correlation and is statistically significant as the value of sigma is

below 0.05. So, respondents who are oriented towards sustainability are willing to pay more for eco-friendly scrubs.

The price of scrubs has a negative correlation with scrub properties by a factor 0.622, which is a very high correlation and is statistically significant, as sigma is below 0.05. This implies that people are willing to pay more for the eco-friendly scrubs and can compromise on the properties of the scrubs.

V. Effect of Age and work experience on the sustainability orientation and scrub properties

Table 8, Correlation co-efficient and sigma values for correlation for age and work-experience

	Sustainability Orientation & Scrub Properties	Age	Work-Experience
Pearson Correlation coefficient	-0.341	0.242	0.364
Sigma (2-Tailed)	0.000 (<0.05)	0.014 (<0.05)	0.000(<0.05)

Age and work experience are negatively co-related by a factor of 0.214 and 0.323, respectively to scrub properties, which is a moderate correlation, and as the value of sigma being less than 0.05, the results are statistically significant. This implies that a respondent with higher

age and greater work experience, eco-friendliness is the most important property of scrub over other properties like feel, comfort, color, and fitting.

VI. Price of the scrub as a factor affecting the correlation between sustainability orientation and scrub properties

For this particular comparison, the population was divided into two parts, the respondents who were willing to pay higher price for the eco-friendly scrubs, which were 59 and those who disagreed to pay higher price for the scrubs, which were 43. So, below is the statistical comparison of both the population

Table 9, Correlation co-efficient and sigma values for respondents who dis-agreed to pay higher price for eco-friendly scrubs

	Sustainability Orientation & Scrub Properties
Pearson Correlation coefficient	-0.061
Sigma (2-Tailed)	0.696 (<0.05)

For respondents who dis-agreed to pay higher price for eco-friendly scrubs, the correlation between sustainability orientation and scrub properties is negative by a factor of 0.061, which is very low and is not significant as well, as the sigma value is much greater than 0.05. So it can be concluded that, there is no significant correlation between the two variables.

Table 10, Correlation co-efficient and sigma values for respondents who agreed to pay higher price for eco-friendly scrubs

	Sustainability Orientation & Scrub Properties
Pearson Correlation coefficient	-0.397
Sigma (2-Tailed)	0.002 (<0.05)

For respondents who agreed to pay higher price for the eco-friendly scrubs, correlation between sustainability orientation and scrub properties is negative by a factor of 0.397, which is a moderate correlation, and is statistically significant; as the sigma value is lower than 0.05. So it can be concluded that the respondents willing to pay more for the eco-friendly scrubs are more sustainably oriented and eco-friendliness is the most important property that these respondents demand from the scrubs.

Chapter 11: Conclusion

From the above study, following conclusions can be drawn:

- The respondents who are sustainably oriented, can compromise on scrub properties like feel, comfort, fitting, color, for the eco-friendliness of scrubs.
- Among the gender, correlation between sustainability orientation and scrub properties was significant among females. The female populated was found to be more oriented towards sustainability and they chose to buy eco-friendly scrubs by paying a higher price for it. Thus gender does moderate the relationship.

- From the two departments chosen, the Rehab department and ICU department, respondents from the ICU department were more sustainably oriented and willing to buy eco-friendly scrubs, by paying a higher price for it. Thus different departments in the hospitals also moderate the relationship between the two variables.
- Age and work experience were also considered as factors affecting sustainability orientation and scrub properties. So, the respondents with greater age and higher work experience were more sustainably oriented and eco-friendliness is the most important property they demand over other scrub properties.
- For the price of scrubs, respondents who were willing to pay higher price, were in majority and they had a higher orientation towards sustainability and eco-friendly scrubs.

Chapter 12: Limitations of Study

- The study was carried-out in only two departments of the hospitals; ICU and Rehab. For further studies, it can be extended to other departments to see the differences in perceptions of people working in different departments.
- The population in the study was classified as males and females. For further studies, it can be divided as per the designation of respondents in the hospitals and then a correlation can be compared designation wise.
- The population was chosen from hospitals in the nearby areas of Ypsilanti. For further studies, it can be extended to other hospitals in Michigan or to a different state.

Chapter 13: Definition of terms

1) Eco-friendly:

A loose term often used in marketing to inform consumers about an attribute of a product or service that has an environmental benefit. This term does not necessarily indicate all attributes of a product or service is environmentally benign.

(“American Hotel and Lodging Association”, 2011)

2) Medical professionals:

A person, who by education, training, certification, or licensure is qualified to and is engaged in providing healthcare.

(“Health Care Professional”, 2008)

3) Sustainability

Sustainability is a new way of thinking about an age-old concern: ensuring that our children and grandchildren inherit a tomorrow that is at least as good as today, preferably better.

(“Glossary of green terminology”, 2011)

4) Scrubs

Cotton or cotton/polyester wearing apparel consisting of a short-sleeved shirt and drawstring pants is the universal uniform of those daring men and women of action, the surgeons, often faded Kelly green.

(“Surgical Scrubs”, 2002)

5) Organic Cotton

Organic cotton refers to cotton grown according to established standards, which prohibit the use of toxic and persistent agro-chemicals, as well as GM (genetically modified) organisms (Goworek 2011).

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Appendix A Survey Form

This study is a research study and is aimed at determining the perceptions of the medical professionals and medical staff towards the sustainability and towards the acceptance of eco-friendly medical scrubs.

The participation in the survey is voluntary and the responses would strictly be kept confidential. The identity of the subjects would strictly be kept anonymous. It would take about 10-15 minutes for responding to the survey. Refusal to participate would not involve any penalty or loss of benefits to the subjects. The survey questionnaires will not be coded, so, the identity of the subjects will strictly be kept confidential. The results of the survey will be in generalized terms and thus, the subjects participating in the survey won't be addressed. The subjects can opt out of the survey or dis-continue the survey at any-time without any questions being asked. The dissemination of results will only be in the project report that would be submitted to the university.

Completing and returning the questionnaire constitutes my consent to participate.

1) Gender: Male Female

2) Age: 20-30 30-40 40-50 50+

3) Department of the hospital you work in: _____

4) Years of work Experience: _____

Scrub Properties

1. I am more concerned about the color of the scrub than if it is Eco-Friendly

5	4	3	2	1
Strongly	Agree	Neither Agree	Disagree	Strongly
Agree		nor Disagree		Disagree

2. I am more concerned about the comfort of the scrub than if it is Eco-friendly

5	4	3	2	1
Strongly	Agree	Neither Agree	Disagree	Strongly
Agree		nor Disagree		Disagree

3. I am more concerned about the feel of the scrub than if it is Eco-friendly

5	4	3	2	1
Strongly	Agree	Neither Agree	Disagree	Strongly
Agree		nor Disagree		Disagree

4. I am more concerned about how well the scrub fits then if it is Eco-friendly

5	4	3	2	1
Strongly	Agree	Neither Agree	Disagree	Strongly
Agree		nor Disagree		Disagree

5. I am more concerned about the type of material of the scrub than if it is Eco-Friendly

5	4	3	2	1
Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

6. I am willing to pay more for the Eco-friendly scrub even though it costs more than the regular scrub

5	4	3	2	1
Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

Sustainability Orientation:

1. I take active interest in what happens to the environment

5	4	3	2	1
Very Often	Often	Sometimes	Rarely	Never

2. I believe that waste minimization and recycling at work benefits me

5	4	3	2	1
Very Often	Often	Sometimes	Rarely	Never

3. I would prefer to purchase the products manufactured from recyclable or bio-degradable raw-materials

5	4	3	2	1
Very Often	Often	Sometimes	Rarely	Never

4. I would prefer to recycle the products I use, rather than disposing them

5	4	3	2	1
Very Often	Often	Sometimes	Rarely	Never

5. I would always try to switch off lights when not required and save electricity and would encourage people to do the same.

5	4	3	2	1
Very Often	Often	Sometimes	Rarely	Never

Appendix B Permission Letter

EASTERN MICHIGAN UNIVERSITY

Education First

July 19, 2011
Determination

COT-HSRC Initial
Application

EXPEDITED APPROVAL

To: Siddharth S. Alashe
School of Technology Studies

Re: **COT-HSRC # 1018** Category: Approved Expedited Research Project
Approval Date: July 20, 2011

Title: **Perceptions of Medical Professionals towards Sustainability Orientation and acceptability of Eco-Friendly Medical Scrubs.**

The College of Technology Human Subjects Review Committee (COT-HSRC) has completed their review of your project. I am pleased to advise you that **your expedited research has been approved** in accordance with federal regulations.

Renewals: Expedited protocols need to be renewed annually. If the project is continuing, please submit the **Human Subjects Continuation Form** prior to the approval expiration. If the project is completed, please submit the **Human Subjects Study Completion Form** (both forms are found at <http://www.ord.emich.edu/research/compliance/human/human.html>).

Revisions: Expedited protocols do require revisions. If changes are made to a protocol, please submit a **Human Subjects Minor Modification Form** or new **Human Subjects Approval Request Form** (if major changes) for review (see: <http://www.ord.emich.edu/research/compliance/human/human.html>).

Problems: If issues should arise during the conduct of the research, such as unanticipated problems, adverse events, or any problem that may increase the risk to human subjects and change the category of review, notify the COT-HSRC committee within 24 hours (email and phone below). Any complaints from participants regarding the risk and benefits of the project must be reported to the COT-HSRC.

Follow-up: If your expedited research project is not completed and closed after three years, the COT-HSRC will require a new **Human Subjects Approval Request Form** prior to approving a continuation beyond three years.

Please use the COT-HSRC number listed above on any forms submitted that relate to this project, or on any correspondence with the COT-HSRC.

Good luck in your research. If we can be of further assistance, please contact me at 734-487-1161 or via e-mail at pmajeske@emich.edu. Thank you for your cooperation.

Sincerely,
Paul T. Majeske
Administrative Chair
College of Technology Human Subjects Review Committee