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Green Practices among Fashion Manufacturers: Relationship with Cultural Innovativeness and Perceived Benefits

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Abstract: The purpose of this study was to examine green practices implemented among fashion manufacturers and identify factors that drive the adoption of those practices, specifically focusing on a company's cultural innovativeness and the perceived benefits of green innovations. An online survey was created containing both open-ended and multiple-choice questions using Likert scales. Data were gathered from 29 fashion manufacturers that were identified by the Google search engine and then approached. Qualitative data were analyzed to obtain insights into fashion manufacturers' green practices and a cluster analysis was conducted to categorize companies into distinct groups based on their level of green product innovations and green process innovations. Our findings suggest that the adoption of green practices was related to a company's internal characteristics such as cultural innovativeness and social responsibility perceptions. Perceived benefits from green practices were not a sufficient motivator for adopting those practices. It is important to examine manufacturers' perceptions of becoming more involved in green practices because they have great potential to make a positive impact on the mainstream industry and appeal to a wider market audience.

Keywords: green innovations; perceived benefit; corporate cultural innovativeness; fashion manufacturer

1. Introduction

Environmental consciousness has grown into a global phenomenon influenced by the environmental movement, which began in the late 1960s. Increasing awareness of ecological concerns in societies, along with the trend toward compliance with international environmental law, has changed the competitive pattern in various industries (Chen et al. 2006). Particularly in retailing, companies are scrambling to present their green image by producing green products to attract consumers, since consumers are looking for and expecting products that help preserve the natural environment. Fashion retailers are no exception as numerous fashion brands are going green by engaging in sustainable business practices. Patagonia has been a standout example of setting environmental priorities in the fashion industry by developing recycled and organic materials and pledging a certain amount of sales to environmental groups. In recent years, various fashion companies have addressed sustainability by implementing innovative technology and design. For example, a new denim company, Unspun, has introduced digitally customized jeans that are produced through automated manufacturing systems. Any leftover garments made with these systems can be spun into a new pair of jeans, resulting in zero waste. Another innovative fashion company, Petit Pli, designs adaptive children's clothing that grows with children up to seven sizes as the pleated recycled fabric expands in two directions. Even fast fashion companies have jumped on the green bandwagon and offer eco-friendly collections consisting

of garments made from organic and recycled materials (e.g., H&M's Conscious collection, Zara's Join Life collection) that can reduce environmental impacts.

The fashion industry is recognized as the second-largest polluter, followed by the oil industry (Market Watch 2019). One critical problem in the fashion industry is the use of water because textile manufacturing processes require 93 billion cubic meters of water every year; additionally, a large amount of water that contains bleaches, acids, dyes, and softeners is discharged and contaminates clean water globally (Market Watch 2019). Making a single fashion product requires various resources (e.g., electricity, water, pigments, zippers, buttons, fabrics, rubber, and thread) and processes (e.g., spinning, weaving, knitting, printing, washing, bleaching, dying, and finishing) which inevitably leads to a large number of people working in the industry. The total number of people employed in apparel manufacturing is reported to be 110.8 thousand in 2018 (U.S. Bureau of Labor Statistics 2018). In addition to the nature and the scale of the fashion manufacturing industry, the sizable consumption of fashion products and related services has great potential to affect the environment. On average, one American family each year spends $1833 for apparel and apparel services such as laundry and dry cleaning (U.S. Bureau of Labor Statistics 2018). Considering the scope of recourses and labor required as well as consumer involvement, the fashion industry has great potential to affect the environment positively by adopting green strategies and making efforts to become environmentally friendly.

Due to the growing level of environmental awareness and interest in corporate social responsibility (CSR), sustainability has become a popular topic in academic research. Previous studies have examined consumers' green apparel purchase behaviors (e.g., Ha-Brookshire and Norum 2011; Perry and Chung 2016) and investigated green practices performed by companies including how environmental issues are influencing the adoption of green practices (e.g., Foster and Green 2000), the dimensions of green practices (e.g., Hemmelskamp 1997), the drivers of adopting green practices (e.g., Noci and Verganti 1999), and firm- and country-level factors (Banerjee et al. 2019). However, despite the size of the fashion manufacturing industry and its environmental impact, CSR research that focuses on fashion manufacturers is very limited. To address the gap in the current literature, this study used qualitative and quantitative methods to provide an in-depth overview of green practices in the fashion manufacturing industry. As consumers grow increasingly more aware of environmental problems, companies are facing escalated pressure to become green in all stages of the supply chain (Chen et al. 2017). Stakeholders are requiring manufacturers to be greener and socially responsible regarding their products and processes (Rusinko 2007). It is particularly important to understand fashion manufacturers' perspectives toward green practices as they are capable of influencing the overall fashion industry by facilitating green production and consumption of fashion products. The purpose of this study, therefore, was to examine green practices implemented among fashion manufacturers and identify factors that drive the adoption of those practices, specifically focusing on a company's cultural innovativeness and the perceived benefits of green innovations.

2. Literature Review

2.1. Green Innovations

There are a number of studies that examine the green innovation strategies adopted by companies. Kemp (2008) and Rennings (2000) described green innovations as new ideas, behaviors, products, and processes that contribute to a reduction in environmental impacts. Hemmelskamp (1997) described the term as innovations that aim to avoid the negative environmental impacts caused during the production process and by products. They include: (1) reducing resource use, (2) minimizing pollution caused by the production, consumption, or disposal of products, and (3) cleaning up past environmental damage. These researchers commonly defined green innovations as a way to reduce or avoid negative impacts on the environment. McDonough and Braungart (2002) expanded this concept and suggested that reducing environmental impacts is not enough. In their book, Cradle-to-Cradle, they explained that an environmental approach of "being less bad" is not a strategy for success over the long term.

For example, they pointed out that recycling is actually downcycling because it reduces the quality of a material overtime. Their Cradle-to-Cradle philosophy involves designing products that can be turned into nutrients; a biological nutrient is a product that is designed to safely biodegrade to the environment, and a technical nutrient is a product that is designed to circulate as a valuable nutrient for a new product in a closed-loop technical cycle. In line with rejecting the idea of simply "being less bad", Carrillo-Hermosilla et al. (2009) and Oltra and Jean (2009) took an approach of 'improving' environmental performance by applying green innovations; green innovations were not limited to reducing or avoiding negative impacts, but involved an active form of benefitting and contributing to the environment (see Carrillo-Hermosilla et al. 2009) for a comparative overview). A company's green innovations can be categorized into two types: green products and green processes, representing hardware and software innovations respectively (Chen et al. 2006). Green product innovations involve market-oriented practices that are more directly related to customer demand, such as the development of green products and packaging designs to differentiate itself from non-green products (Shrivastava 1995). Green process innovations relate to firm-internal practices such as the implementation of a closed-loop extraction system. Green process innovations are more internally driven practices, but they are often motivated by a desire to obtain benefits in the market by reducing cost from increasing energy efficiency or reducing material uses (Foster and Green 2000). In this study, green innovations are used as a broad term referring to ideas, activities, policies, procedures, technologies, or objects that are perceived as environmentally friendly. This involves any type of hardware or software adoptions related to energy-saving, pollution prevention, recycling, reuse, green product design, and a company's environmental management (Chen et al. 2006).

2.2. Company's Cultural Innovativeness

Not all companies practice green innovations, nor do they adopt green innovations in the same way. Companies take different strategies in their adoption of green innovation (Van Wassenhove and Corbett 1991). While some companies take a follower strategy by simply responding to legal regulations, others take a market-oriented strategy by practicing environmentally friendly strategies in which green innovation is perceived as a major component of a company's strategy (Van Wassenhove and Corbett 1991).

A major factor that influences the decision of which strategy a company incorporates is a company's organizational characteristics. For example, larger and older companies are more likely to practice green innovations given the greater amount of available resources as well as stakeholder expectations (Banerjee et al. 2019). Cultural innovativeness is also found to be a crucial characteristic of an organization that has an effect on adopting green strategies (Bernauer et al. 2006). In general, when companies display greater cultural innovativeness, it increases the probability that they will also be environmentally innovative. This is because adopting green strategies can be considered as a way of being progressive for a company and innovativeness is the bottom-line behavior in its diffusion process (Rogers 2003). Leadership's attitude toward a change, internal characteristics of organizational structures such as centralization, complexity, and formalization, and external characteristics such as system openness are factors that are related to a company's cultural innovativeness (Rogers 2003). Thus, this study hypothesized that fashion manufacturers with greater cultural innovativeness will be more likely to adopt green innovation strategies including both green product innovations and green process innovations.

2.3. Perceived Benefits

Several studies have focused on examining the advantages of adopting green innovations. For example, Porter and van der Linde (1995) argued that pollution is a sign of inefficiency because pollution is caused by incomplete or ineffective resource use. Chen et al. (2006) stated that businesses can increase resource productivity through green innovations to make up for the environmental costs. Consistently, Newman and Hanna (1996) suggested companies that are proactive in eliminating process-

and product-related waste can not only gain the cost advantage associated with their improvements, but also avoid additional costs resulting from penalties for environmental violations. In addition, companies that adopt innovations prior to their competitors can obtain "first mover advantages" including the benefits from charging a higher price for green products, improving the company's image, and developing new markets (Hart 1995; Peattie and Charter 2003). In an empirical study of the metals industry (one of the most polluting industries), Amores-Salvadó et al. (2014) found a significant and positive effect of green innovations on the company's financial performance such as growth in return on assets (ROA), return on sales (ROS), and return on capital employed (ROCE). A similar finding was detailed in a meta-analysis (Albertini 2013) which suggested that corporate environmental performance is positively related to financial performance. Therefore, this study hypothesized that fashion manufacturers that are more involved in green product and process innovations will perceive greater benefits of adopting these innovation strategies.

Based on the findings of previous studies, four hypotheses were created to explain the relationships between green innovations (i.e., green product innovations and green process innovations), corporate cultural innovativeness, and the perceived benefits of adopting green innovations. Although not found in previous findings, this study also hypothesized that green product innovations and green process innovations will be significantly correlated. This is based on the assumption that leadership's management decisions of being environmentally innovative will affect both types of green innovations. Therefore, it was expected that fashion manufacturers that are more engaged in using green materials are more likely to go green during the manufacturing process such as reducing water/electricity consumption and the emission of toxic waste.

Hypothesis 1. *Companies with higher levels of green product innovations will display higher levels of corporate cultural innovativeness.*

Hypothesis 2. *Companies with higher levels of green process innovations will display higher levels of corporate cultural innovativeness.*

Hypothesis 3. *Green product innovations will be significantly correlated with green process innovations.*

Hypothesis 4. *Companies with higher levels of green innovations will display higher levels of the perceived benefits of adopting green innovation.*

3. Methods

An online survey containing both open-ended questions and multiple-choice questions using Likert scales was created to collect data. Potential participants were initially identified by using the Google search engine. In order to find manufacturers in fashion related fields, the terms used for the search were combinations of "manufacture" and "apparel" or "fashion." The combinations of "apparel manufacture" or "fashion manufacture" and "green" or "organic" were also used for the search. Using the information provided on the company's website, an invitation to an online survey was sent to the companies via e-mail. The invitation contained a short description of the study and a web-address hyperlink that directed participants to our survey. Definitions and examples of important terms (e.g., green innovations, green related practices) that appeared in questions were provided in the survey to help participant understanding and prevent confusion.

The survey was comprised of five major parts, which began with questions exploring the overall green performance of their company (e.g., How would you describe the overall green-related practices in your company?). Topics of open-ended questions were as follows: a company's current green-related activities or polices (part 1); reasons for applying green innovations (part 2); and reasons for not applying green innovations (part 3). (Part 3 was presented to participants who responded that, overall, their company was either poorly green or not green at all.) For analyses of open-ended questions, two

experts from the field of fashion and textiles read responses and categorized them based on keywords and their contextual meanings. To ensure validity and reliability, an additional expert from the same field reviewed the data and high consistency was reported in categorizations of the responses.

The following part included five-point Likert scale questions that were used for quantitative analyses to test the aforementioned hypotheses (part 4). A total of eight items were used to measure green product innovations and green process innovations which were adopted from Chen et al. (2006) study. A company's cultural innovativeness was measured by three items that were adopted from Hurley and Hult (1998) study. The perceived benefits of green innovations were measured by three items adopted from McFarlan (1981) study. Items from previous studies were slightly modified to reflect the purpose of the current study. For example, an item that measured green process innovations in Chen et al. (2006) study, "The manufacturing process of the company reduces the consumption of water, electricity, coal, or oil" was changed to "The manufacturing process of my company reduces the consumption of water, electricity, coal, or oil". Lastly, several questions inquiring about general information of participants and their companies were also included (part 5). Because our sample size was relatively small, a cluster analysis was conducted using quantitative data to compare the means between the groups. A two-cluster solution was suggested by the results. An independent sample t-test comparing the means of ordinal data is reported to have good power with small samples (Sullivan and D'Agostino 2003).

E-mails were initially sent to 312 fashion companies. Among those e-mails, 44 were returned as undeliverable mail. Eventually, 29 online surveys were completed from the 268 companies approached, which resulted in a response rate of 10.82%. Detailed characteristics of participants are presented in Table 1. Approximately 45% of participants were working in upper management positions, primarily consisting of presidents and founders and 28% were designers. The remaining participants were managers, a corporate social responsibility specialist, a merchandiser, an accountant, and a production person. Participants were from four different countries: U.S. (62.07%), Canada (17.24%), South Korea (17.24%), and Sweden (3.45%).

Table 1. Participant Characteristics.

Variable	N	%
Job Title		
Owner/President/Vice president	13	44.83%
Designer	8	27.59%
Manager	4	13.79%
CSR Specialist	1	3.45%
Accountant	1	3.45%
Merchandiser	1	3.45%
Production	1	3.45%
Total	29	100.00%
Country		
USA	18	62.07%
Canada	5	17.24%
Korea	5	17.24%
Sweden	1	3.45%
Total	29	100.00%

4. Results

4.1. Qualitative Data Results

4.1.1. Green Practices of Fashion Manufacturers

Nearly all participants (93.10%) reported that their company is involved in green activities in some way. Diverse types of green practices in the fashion industry were identified; (1) controlling inputs

(e.g., using environmentally friendly raw materials, limiting use of resources), (2) controlling outputs (e.g., reducing waste and emission), (3) integrating environmental technology, and (4) integrating green principles into business management models.

Controlling Inputs

Controlling inputs was the most frequently reported response of how fashion companies incorporate green practices (62.07% of respondents mentioned this topic). One form of controlling inputs was using environmentally friendly raw or treatment materials. Many participants were aware of clean innovation practices, which refers to the integration of environmental considerations into designs to avoid negative impacts on the environment (Murphy and Gouldson 2000). Their practices were anticipatory in nature. Several companies used environmentally friendly materials such as organic cotton and environmentally friendly water-based dyeing. Eco-labels including the Global Organic Textile Standard (GOTS), Oeko-tex label[1], and Sustainable Biodegradable Products (SBP) label[2] were mentioned multiple times as companies were exerting efforts to follow standards of practicing green innovations. In particular, GOTS is recognized as an international standard for organic textiles, as it is certified by the International Working Group and sets strict requirements for organic farming and environmentally and socially responsible textile processing and manufacturing. Some companies reported the intense use of such certifications. For example, one company worked with GOTS certified growers, processors, and finishers to manufacture their garments for babies, children, and adults. One company even reported that all of their products were made from sustainable biodegradable resources. Even without using such certified materials, several companies showed a high degree of controlling material inputs; for example, a company stated that for its jewelry, it uses 90% of recycled material in products and 100% in shipping materials such as boxes, labels, tissue paper, and shredded paper for padding (Id 45). The following responses regarding fashion manufacturers' green practices reflect this topic of controlling inputs.

> "(…) organic cotton fabric dyed by GOTS standards or undyed hemp, silk and wool fabric (all nature) recycled fabrics tags printed on recycled paper." (Id 2)

> "We offer 100% certified organic cotton apparel that is made with wind power (…). We use earth friendly PVC free inks on our tees which reduce the toxic substances in products." (Id 32)

> "All products are made from SBP® sustainable biodegradable resource." (Id 34)

> "We make handbags and accessories of natural fiber materials. We need to do a better job of using renewable energy resources and using more sustainable materials in packaging." (Id 50)

> "Digital dyeing using water based GOTS 2.0 certified fabric dyes on sustainable fabrics—hemp, bamboo, organic cotton and linen." (Id 56)

For some fashion manufacturers, the alteration of inputs resulted in new product development. There were two participants that said their companies develop green product lines: One company indicated that it carries a section of recycled denim (Id 43) and another company wrote about its new product line called "Earth Day" that will be newly launched (Id 18):

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[1] Oeko-tex is a certificated label issued when components of a product satisfy the requirements of the criteria catalogue from Oeko-Tex® standard 100 created by the International Oeko-Tex® Association, a group of 15 textile research and test institutes in Europe and Japan.

[2] Sustainable Biodegradable Products (SBP) is a label for biodegradable products that informs the customer about how the products are made, from the raw materials used to the labor conditions involved, created by the SBP® Project Team at EnviroTextiles LLC, a developer of hemp and hemp blend textiles.

"We will be having an Earth Day product offering... We are projecting three tiers for future sustainable design and are getting ready to grow our sustainability efforts. Tier 1 includes organically grown fibers locally. Tier 2 includes organically grown and organically processed in the mill. The third tier includes organically grown and organically processed at mill and vendor level, shipping, handling, packaging, and end of product lifecycle considerations." (Id 18)

Another form of controlling inputs was limiting the use of resources. As shown below, responses from participants in this category include turning off machinery after use, reducing the amount of paper used, and reducing the use of a vehicle.

"Some transportation efficiencies, energy efficiencies in stores (. . .)" (Id 46)

"(. . .) reduced packaging materials (. . .)" (Id 47)

Controlling Outputs

Controlling outputs which involves controlling waste and emissions by recycling or reusing materials was also frequently found in the responses (37.93% of respondents mentioned this topic). The degree of the company's practices varied from "when possible" to "strictly." Below are few examples of responses that were categorized into this section.

"Strictly in environmentally separation of trash, (. . .) Recycling when possible." (Id 7)

"We recycle approx. 90% of all waste produced during the manufacturing of our garments. We have an apparel recycling program which gives the end user 25% back for recycling." (Id 33)

"(. . .) if we have to print, we use at least 50% post consumer recycled paper." (Id 43)

Integrating Environmental Technology

In addition to controlling inputs and outputs, the fashion industry has adopted technologies which minimize the environmental impact (17.24% of respondents mentioned this topic). Even though some responses were a bit vague in terms of exactly what kind of technologies have been adopted, it seems that energy-efficient machines have been commonly utilized by fashion manufacturers. As shown below, some manufacturers have adopted high technology innovations such as biomass to replace fuel oil while others have intentionally begun to use old-fashioned machinery to consume fewer resources.

"Sewing by treadle machine (no electricity)." (Id 2)

"Efficient machinery." (Id 15)

"Biomass to replace fuel oil, energy efficiency project (LED lights, etc) (. . .)" (Id 44)

"Renewable energy (. . .)" (Id 52)

Integrating Green Principles into Business Management Models

Managerial green practices refer to having a management system that aims to achieve an environmentally sound business by integrating green principles in the business management structure. Responses revealed that many companies are directed by sustainability principles and have reliable environmental management systems (13.79% of respondents mentioned this topic). Their green principles seem to be reflected in major management decisions of the company. For example, some fashion manufacturers reported that they have worked with other environmentally conscious companies in the past such as partnering with local green businesses for events (Id 58) and working with a web-hosting company that uses green energy (Id 2). Other responses in this category are shown below.

"Every decision we make is informed by the sustainability principles." (Id 21)

"(. . .) social responsibility is practices throughout all manufacturing and transportation levels." (Id 34)

"(. . .) waste management system, life cycle analysis, environmental policy, environmental management system, (. . .)" (Id 44)

4.1.2. Reasons for Practicing Green Innovations

The survey included an open-ended question inquiring about reasons for adopting green innovations. This question was only presented to participants if they answered yes to a previous question of whether adopting green innovations is important to their company. All participants responded yes to the screening question and, thus, provided responses for this section. Their responses fell into three broad categories: to be socially responsible, to gain competitive advantage, and influence by social trends.

Being Socially Responsible

The most common reason for adopting green innovations was based on environmental awareness (51.72% of respondents mentioned this topic). Fashion manufacturers believed that it is crucial to protect the environment and reduce pollution that harms the ecosystem. They also expressed the interconnection between human behaviors, the environment, and human beings as a part of natural ecosystems. Responses reflected diverse concerns related to the environment, for example, the problem of the extravagant use of natural resources (Id 9) and concerns about the already polluted environment (Id 45). They expressed that practicing green innovations is important to preserve our natural environment. One company was aware of how much pollution it produces and stated that adopting green innovations was a way to reduce its carbon footprint (Id 19). Other responses that fell into this category as reasons for practicing green innovations are shown below.

"For our environment and earth." (Id 12)

"All companies should adopt as many green innovations as possible, as quickly as they can afford to—for the sake of our planet (. . .)" (Id 17)

"Because we are social, ecological beings." (Id 21)

"Because I love the planet we live on." (Id 32)

"(. . .) preserve biodiversity and natural lands." (Id 44)

"[to do] your part for a cleaner world". (Id 47)

Several participants extended the concept of social responsibility to go beyond environmental issues and include matters that involve the well-being of the society and its members. Being socially responsible is a core concept of corporate social responsibility (CSR), which is corporate self-regulations integrated into a business management plan (McWilliams and Siegel 2001; Sheehy 2015). This refers to not only taking responsibility for whatever impact the company has on the environment and society but also actively promoting the public's well-being (McWilliams and Siegel 2001). Several participants expressed the pressure to maintain a healthy environment taking into account the welfare of their employees and future generations. Following responses reflect this broader concept of social responsibility that were mentioned as a basis for practicing green innovations.

"(. . .) employees' health issues." (Id 7)

"I believe it is very important to reduce our impact on the earth so it will continue to be inhabitable and healthy for future generations of all forms of life." (Id 2)

"For our future generations." (Id 33)

"(…) being Eco friendly is just one part of being socially responsible." (Id 43)

Gaining Competitive Advantage

While the number of responses in this category were much fewer compared to the previous category, several participants indicated that practicing green innovations was considered important for generating competitive advantage (24.14% of respondents mentioned this topic). Previous research stated that proactive companies perceive several advantages from green innovations including lower costs of processing, fewer material inputs, improvement in corporate reputation, consumers' positive brand evaluation, and brand recommendations (e.g., Sharma and Vredenburg 1998). Furthermore, companies place themselves in a favorable position by responding to an increasing number of consumers who are willing to choose environmentally friendly products and pay higher prices for them (e.g., Henriques and Sadorsky 1996). In the same manner, participants from this study saw adopting green innovations as a strategy for attaining both firm-oriented (e.g., cost savings) and market-oriented (e.g., reputation) advantages. The following responses from fashion manufacturers suggested that companies are incorporating green innovation strategies to gain competitive advantage.

"It's important because innovation is a way to stay ahead of the competition. Green innovation helps one's customers to see that the company cares about the future of the environment." (Id 18)

"Applying green innovations could improve the brand image and consumers' positive attitude toward the brand." (Id 40)

"(…) Eventually, it will become more expensive to have harmful products and practices, so we need to get ahead of it." (Id 46)

Reflecting Social Trends

Some participants reported that green innovations are a social trend and it is a major reason for adopting green practices in their company (13.79% of respondents mentioned this topic). Many studies indicated that environmental policies have a strong impact on adopting environmental practices (e.g., Porter and van der Linde 1995; Kemp 1997; Faucheux and Nicolai 1998). However, no companies mentioned that in this study. Corporate decisions for adopting green innovation practices seemed to be more influenced by social trends rather than coercive regulations. The responses below reflect this perception well.

"Green innovation is not a unique movement. It is a trend today. Based on everyone's effort in our society, we have to pursue and apply that concept to our manufacturing for the sustainability." (Id 26)

"The world is in a major shift to green practices … " (Id 46)

"There is no other option.... And to be taken seriously as an ethical company you have to walk the talk, and help take what's existing to the next level through innovation and action" (Id 58)

4.1.3. Reasons for Not Practicing Green Innovations

Participants who indicated that their companies were either not engaging or poorly engaging in green practices were asked to explain what hindered their adoption of green innovations. Eight participants from a total of 29 responded to this question (27.59%). Major reasons for not practicing green innovations were identified: (1) there is no regulation or top-down leadership regarding the adoption of green innovations, and (2) adopting green innovations is perceived as costly in terms of manufacturing costs, time, and energy. Responses that were included in this section are shown below.

"The green industry is not regulated by any governmental body in Textile/Apparel industry . . . " (Id 7)

"I think price point is very prohibitive for my company. We sell garments from $4-60, so it's difficult to get Fair Trade Certified or organic raw materials for the price point and make a profit. There is also perception that these materials would be more expensive and little research to prove whether or not they really are." (Id 18)

"CEO only focus[es] on the amount of sales rather than brand image or green innovations." (Id 40)

"We do not really think about green. It is time consuming and needs to put a lot of thought and energy into it." (Id 57)

4.2. Quantiative Data Results

In order to obtain a more objective overview of green innovations among fashion manufacturers, a cluster analysis was conducted using the Likert scale data. Table 2 shows the items that were used to measure the constructs of this study and reports scale reliability results of Cronbach's alpha. Cronbach's alphas were all higher than 0.70 demonstrating internal consistency of the measures. Cluster analysis categorized companies into distinct groups based on their level of green innovations. Green product innovations and green process innovations were used as clustering variables and a two-cluster solution was suggested by the results. The first cluster consisted of companies that display high levels of green innovations. There were 18 companies in this group that scored high in both green product innovations (M = 4.76, SD = 0.38) and green process innovations (M = 4.64, SD = 0.51). The second cluster consisted of companies with low levels of green innovations. There were 11 companies in this group and their scores of green product innovations (M = 2.02, SD = 0.87) and green process innovations (M = 2.66, SD = 0.81) were significantly lower than those of companies in the first cluster. The differences between the groups were significant regarding green product innovations, $t(27) = 11.78$, $p < 0.001$ and green process innovations, $t(27) = 8.13$, $p < 0.001$.

The means of cultural innovativeness and the perceived benefits of adopting green innovations in the two clusters are shown in Table 3. According to the t-test results, there was a significant difference in their cultural innovativeness scores, $t(27) = 2.81$, $p = 0.009$. Cluster 1 (M = 4.63, SD = 0.64) had a significantly higher mean than cluster 2 (M = 3.85, SD = 0.86). This indicates that companies with higher levels of green product and process innovations are more likely to possess greater cultural innovativeness. In terms of the perceived benefits of adopting green innovation, the difference between the two clusters was insignificant, $t0(27) = 1.33$, $p = 0.19$, which implies that the company's perception of benefits associated with adopting green innovations did not significantly affect the actual implementation of green innovation practices. Therefore, H_1 and H_2 were supported whereas H_4 was not.

Table 2. Items Used to Measure the Constructs and Cronbach's Alphas.

Constructs	Items	Cronbach's Alphas
Green product innovation	In product development or design, my company chooses product materials that produce the least amount of pollution.	0.95
(Chen et al. 2006)	In product development or design, my company chooses product materials that consume the least amount of energy and resources.	
	In product development or design, my company uses the fewest amount of materials to comprise the product.	
	In product development or design, my company would consider whether the product is easy to recycle, reuse, and decompose.	
Green process innovation (Chen et al. 2006)	The manufacturing process of my company reduces the emission of dangerous waste or substances. The manufacturing process of my company recycles reusable waste and emission. The manufacturing process of my company reduces the consumption of water, electricity, coal, or oil. The manufacturing process of my company reduces the use of raw materials.	0.89
Cooperate cultural innovativeness (Hurley and Hult 1998)	Management seeks innovative ideas. Innovation is accepted in programs/projects. Technical innovation is accepted.	0.78
Perceived benefits of adopting green innovation (McFarlan 1981)	In the fashion industry, green innovation can be used to generate new products. In the fashion industry, green innovation can change the basis of competition. In the fashion industry, green innovation can change the balance of power in business relationships.	0.71

Table 3. Means (Standard Deviation) of the Constructs.

	Cluster 1: High Level of Green Innovations (n = 18)	Cluster 2: Low Level of Green Innovations (n = 11)	t(27)
Green product innovations	4.76 (0.38)	2.02 (0.87)	11.78 ***
Green process innovations	4.64 (0.51)	2.66 (0.81)	8.13 ***
Cultural innovativeness	4.63 (0.64)	3.85 (0.86)	2.81 **
Perceived benefits of adopting green innovations	4.31 (0.83)	3.88 (0.90)	1.33

** $p < 0.01$, *** $p < 0.001$.

In order to test H$_3$, the correlation between green product innovations and green process innovations was assessed (Table 4). The Pearson product-moment correlation coefficient was 0.88 ($p < 0.001$), suggesting that the two variables are strongly associated. Therefore, H$_3$ was supported.

Table 4. Correlations of the Constructs.

	1	2	3	4
1. Green product innovation	1.00			
2. Green process innovation	0.88 ***	1.00		
3. Cooperate cultural innovativeness	0.63 ***	0.54 **	1.00	
4. Perceived benefits of adopting green innovation	0.13	0.18	0.05	1.00

** $p < 0.01$, *** $p < 0.001$.

5. Discussion

There is a growing level of environmental awareness and interest in ethical products in the current market. However, previous research continuously suggests that high levels of environmental awareness do not lead to an actual market performance (e.g., Chatzidakis et al. 2004; Johnstone and Tan 2015; Pickett-Baker and Ozaki 2008; Strong 1996). In an attempt to understand this awareness-performance gap, a number of studies in the field of apparel and textiles have examined the topic of sustainability, mostly focusing on consumers' green purchasing behaviors (e.g., Ha-Brookshire and Norum 2011; Perry and Chung 2016). Arrigo (2013) mentioned in his study that there is a lack of research which examines the corporate social responsibility (CSR) activities in fashion companies. Very few studies have addressed the topic from the fashion manufacturer's perspective to identify the drivers and barriers of engaging in green corporate activities. It is important to examine manufacturers' perceptions of becoming more involved in green practices because they have great potential to make a positive impact on the mainstream industry and appeal to a wider market segment. To address the gap in the current literature, this research examined green practices performed by fashion manufacturers and factors that influence their adoption of green product and green process innovations.

The majority of participants (93.10%) that were recruited for this research claimed that their company was involved in some form of green innovations. According to our qualitative data, which were based on responses of open-ended questions, among many types, controlling inputs, which refers to using environmentally friendly raw and treatment materials and limiting the use of resources appeared to be the most common form of engaging in green innovations among fashion manufacturers. With an escalated expectation on companies, as influencers in the environmental sphere, companies are increasingly placing more focus on their CSR practices. The number of companies directing CSR from the top executives in 2017 has increased approximately 75% compared to 2012 (McPherson 2018). Our findings suggested that fashion manufacturers are no exception in this major trend of addressing sustainability within a business as they are making investment in matters that are important for the ecological environment.

Using qualitative and quantitative methods, this study identified factors that facilitate and inhibit fashion manufacturer's engagement in green innovations. According to the results, reasons for practicing green innovations fell into three broad categories: to be socially responsible, to gain competitive advantage, and being influenced by social trends. The prominent reason was, however, based on social responsibility. They believed that it is important to preserve the natural environment and reduce pollution that harms the ecosystem. Although this research aimed to examine environmental awareness and green activities, some companies went beyond environmental matters and mentioned social responsibility issues that involve the well-being of society and its members.

Our quantitative data results illustrated that green product innovations and green process innovations are strongly correlated. In other words, companies that are more engaged in choosing product materials that have less impact on the environment are more likely to go green during the manufacturing process of apparel products such as reducing water/electricity consumption and waste. Companies that scored high in green product and process innovations were in stark contrast to companies that scored low in both measures. Those in the first cluster scored significantly higher in green product and process innovations; the mean scores were 4.76 and 4.64 for green product and green process innovations respectively from a five-point Likert scale. This implies that these companies are considerably engaged in green corporate activities during the stages of product development/design and manufacturing. On the other hand, the mean scores were significantly lower for companies in the second cluster: 2.02 and 2.66 for green product and green process innovations respectively. According to our results, the first cluster had significantly higher scores of cultural innovativeness than the second cluster, which suggested that when fashion manufacturers are more open to innovative ideas and implementing innovations into their program/project, they are more likely to adopt green product and green process innovations. This finding was similar to that of a previous study that showed companies with greater cultural innovativeness are more likely to be environmentally innovative

(Bernauer et al. 2006). Nidumolu et al. (2009) mentioned that the present market condition has put enormous amounts of pressure on companies on sustainable development. They suggested that companies need to develop innovative solutions as traditional approaches will no longer be effective and sustainability is now the major driver of innovation.

One interesting finding of this study is that there was no statistically significant relationship between the adoption of green innovations and the perceived benefits of green innovations. Our quantitative data results illustrated that fashion manufacturers with high levels of green product and process innovations do not perceive greater benefits from implementing those green strategies. This finding echoes in the qualitative data results that showed gaining competitive advantage was not the most frequently reported reason for adopting green innovations. Rather, based on our findings, the adoption of green practices was more related to a company's internal characteristics including their social responsibility perceptions and cultural innovativeness. Arrigo (2013) explained that CRS practices of fashion companies can produce benefits for the company such as a powerful brand image, profitability, and enhanced consumer perceptions. However, our results imply that although fashion manufacturers are applying green product and green process innovations, they actually do not perceive greater benefits from doing so.

When examining inhibitors of engagement in green innovations, perceived disadvantages such as the high cost and additional time and effort needed for development were found to be reasons for not practicing green innovations. Nidumolu et al. (2009) study revealed the concerns of many CEOs in the U.S. and Europe as they believe that making their operations sustainable and incorporating green products or processes place them at a disadvantage due to the added cost. Green manufacturing will require new equipment and processes that incur additional expenses and this may not deliver any immediate financial benefits. In agreement with Nidumolu et al. (2009) concerns, our findings implied that fashion manufacturers' perceptions of benefits related to adopting green innovations were not a sufficient motivator for them to overcome the cost associated with adopting green practices. Further empirical research is needed to determine whether fashion manufacturers' perceptions of disadvantages have a significant power to actually block them from adopting such practices.

In addition, the absence of environmental regulations was found to be one of the reasons for not adopting green practices. Environmental activists and policy experts have suggested stricter environmental regulations for companies as voluntary actions are most likely insufficient. Others have recommended educating consumers to influence companies to become more sustainable (Nidumolu et al. 2009). While both regulation and consumer education are essential, they may not be enough to have an effect on the mainstream fashion industry. Without presenting any tangible benefits, the essential enhancement of companies' green performance can be hard to achieve. To enhance the level of fashion manufacturers' involvement in green product or process innovations, policymakers may consider carrying out environmental goals by highlighting the benefits associated with green practices and carefully balancing them with additional costs that can be incurred. Further examination on returns and risks associated with green innovations is necessary in this domain, for example, future studies can examine whether fashion manufacturers' green innovations produce a positive return on their sustainability investment relative to its cost.

This study contributes to fill the gap in the current literature by examining the CSR activities of fashion companies. However, this study has several limitations that can provide suggestions for future research. First, there are problems associated with the small sample size. Because our sample only included 29 fashion manufacturers, this study may be prone to selection bias, which can limit the generalizability of the findings. Collecting more data from a wide range of fashion manufacturers and comparing results based on diverse topics such as geographic locations, type of products, and size of the companies would be helpful in generating informative results. In particular, while the majority of companies in our sample were apparel manufacturers, there were a few manufacturers of fashion accessories. It would be useful to have a larger sample for future studies and categorize companies by the type of products they produce to examine differences and similarities across categories. Another

limitation involves items that were used to measure the constructs of this study. Items were adopted from previous studies that were published more than a decade ago. In terms of topics related to environmental issues and social responsibility, public opinions tend to change over time and, accordingly, continuous refinement of their scale is necessary (Roberts 1995). Therefore, using updated items that accurately reflect the current conditions of the fashion industry may be desirable. It would be worthwhile to examine up-to-date information about green product and green process innovations as well as the benefits of adopting green innovations and incorporate those concepts in developing relevant items. Furthermore, this study used a self-report survey which may be susceptible to social desirability bias. Because respondents were faced with providing answers to questions on sensitive matters such as their company's engagement in green performance, they may have provided responses that will be viewed more positively by others. Future research may consider using objective methods to assess fashion manufacturers' performance of green innovations that can replace self-report surveys.

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