Fashion design solutions for environmentally conscious consumers

M Wagner¹,²,³, Y Chen³, A Curteza², S Thomassey¹, A Perwuelz¹ and X Zeng¹
¹GEMTEX, ENSAIT, 2 Allée Louise et Victor Champier, 59056 Roubaix, France
²Faculty of Textiles Leather and Industrial Management, Gheorghe Asachi Technical University of Iasi, B-dul. D. Mangeron Nr. 67, 700050 Iasi, Romania
³College of Textile and Clothing Engineering, Soochow University, Suzhou 215006, China

Email: melissa.wagner@ensait.fr

Abstract. This paper intends to give an overview of the design solutions in fashion for environmentally conscious consumers, presenting green and ethical practices in contemporary clothing design. The results introduce the concept of slow fashion and discuss available fashion design solutions, giving most prominent examples of sustainable products and brands, these contain one or more design features. By this, the discussion extracts the main contemporary ideas. The presented examples of current offers are all envisioning less impact on the environment and society. Sustainable design solutions use more environmentally friendly materials such as organic cotton, incorporate circular design or design for recycling, e.g., replacing button closures with alternative closing possibilities or leather labels with printed versions, or ensure long product life through durability, among other methods. There are differing designs due to creators’ individuality. This overview can be beneficial for the future development of new solutions for more environmentally friendly fashion.

1. Introduction

The present study is part of a PhD project in sustainable design and management of textiles, focusing on consumer perception of ethical fashion. To understand consumer perception, the concept of ethical fashion is analysed in here, identifying design solutions existing in clothing nowadays. The contemporary clothing design can show changes in society.

Ethical or sustainable fashion might sound like a paradox. The fashion industry is one of the most polluting industries and consumers, and their consumption patterns are one of the challengers. But, sustainability, in general, is rising and affecting all kind of business, also textiles: Sustainability has become a key issue in the fashion industry over the past year [1]. The promotion of ethical fashion is becoming more prominent in the fashion industry, also seen in the example of the Ethical Fashion Show in Germany, held parallel to the Berlin Fashion Week; In their Green Showroom, brands from the street and casual wear are present with the focus on design and sustainability: urban Zeitgeist, eco-fair lifestyle and fashion [2]. Eco fashion is focusing more and more on the design, reducing the perception of old-fashioned eco clothing. Contemporary eco clothing design needs to be able to balance ethics, aesthetics and functionality.

According to the push and pull marketing concepts, not only the industry but also consumers are influencers, creating new challenges through their impact on the environment. Consumers have
become more demanding and aware of environmental issues [3]. The question arises, how these consumer needs for more environmentally friendly fashion solutions influence the design of garments? In differently reported studies, consumer behaviour analysis focuses on consumer motivations and decision-making. In this context, ethics reflects morals and leads to pro-social behaviour; Researchers noticed that consumers tend to give socially desirable answers to questions related to their sustainable behaviour, resulting in an attitude-behaviour gap [4-6]. Instead, the study can focus on the measurement of the attitude towards the product design and attributes to define ethical consumer behaviour. Clothing designers are incorporating sustainability into their design strategies and material choices as discussed in the following, presenting contemporary consumer products found in sustainable fashion.

2. Approach

This study investigates into the slow fashion concept and the contemporary design solutions available, and aspects related to environmentally conscious consumers are discussed, presenting most prominent examples of sustainable products, emphasizing on one or more design possibilities, having a better environmental performance than traditional solutions. Results for sustainable practices are presented according to the six main solutions defined by Caniato et al. [7], see table 1, and based on the experience found in literature and current trends, as well as including consumer needs.

| Table 1. Main sustainable solutions |
|-----------------------------------|
| (i) use of organic fibres         |
| (ii) reuse and recycling of materials |
| (iii) vintage practices and second-hand |
| (iv) clean technologies           |
| (v) green certifications           |
| (vi) green product and process design |

3. Results and Discussion

The presented examples of current trends and offers grouped according to the sustainable solution categories have all in common that they have less impact on the environment or society. Referring to the first category, sustainable design solutions use more environmentally friendly materials such as organic cotton. Secondly, by incorporating circular design or design for recycling, designs can replace button closures with alternative closing possibilities or leather labels with printed versions, or among other methods, ensure long product life through durability. There is a broad variety, design solutions are different due to designer individuality and the influence of other factors, such as social and fashion trends. Designs are shaped by various factors such as branding as well as consumer needs, resulting in the design solutions presented in this study. To promote sustainable fashion, consumer needs have to be defined and met accordingly through offering the right design solutions that should have physical but also emotional durability such as long lasting wear and relevance or desirability of consumers.

3.1 Slow fashion concept

On the one hand, due to the environmental problems in the fashion industry and on the other hand, due to the consumer demand and more consciousness, a new concept rises along the traditional fast fashion concept. The slow fashion concept refers to the slow food movement, which focuses on local and small producer [8]. According to the Slow Fashion Award [9], the concept describes high quality realised through design, as well as fair labour conditions. The general aim is to reduce the negative environmental impact of fashion and its processes. This is caused by the use of chemical products, the
exploitation of finite resources, and the high CO₂ emissions [10]. In the following, examples of changes from the fast to the slow fashion design are discussed, inspired by environmental and ethical issues occurring in the fashion industry.

3.2. Sustainable fashion design practices

To create eco or environmentally friendly fashion, sustainable practisers are operating on several levels, either in the whole supply chain or solely in a single company [11]. Eco design can also focus, besides the steps involved in the supply chain, on the pre-consumer phase which includes production and transportation, and it can apply in the use or the post-consumer phase, either through recycling or upcycling. For clothing it has been seen that the environmental impact can be strongly influenced by the use phase of the consumer in the care phase or laundering; additionally, it is possible to involve all the stages of the lifecycle, including at the systems design level [12].

3.2.1. Organic fibres. Organic fibres have less impact on the soil or environment due to the lack of use of toxic insecticides, herbicides or fungicides [7]. Most prominent example for the use of organic fibres in clothing is organic cotton. Often, consumers tend to prefer natural fibres to synthetic [13]; however, most consumers are not aware of the real impact in the production process. E.g., to produce one kilogram of cotton, a high amount of water is needed, up to 10,000 litres of water.

Other natural raw materials from a plant are hemp or kapok, and from an animal source wool and silk which are available as organic wool and peace silk, this refers to a more ethical procedure of gaining the fibres. The wool process is mulesing free, and the alternative silk process can gain the silk without boiling and killing the silk worm. Still, for consumers being highly ethical and therefore avoiding animal products, i.e., living a vegan lifestyle, wool and silk are not suitable.

An example is that of the US brand Patagonia with a management based on sustainable development and an offer of innovative and efficient products [14]. The design strategy uses only organic cotton, and focuses on both the product quality and sustainability [10]. Also, consumers show importance of the origin of the raw material; The Ethnicity report [15] states the high interest of French consumers towards the origin of raw materials and production location compared to environmental or social impact in general in production process [16]; Local suppliers are shortening the transportation cycle. Also, another fibre approach focuses on using more durable textile materials which can prolong the product life, or more sustainable materials such as recycled fibres, described in the following.

3.2.2. Reuse and recycling. The reuse and recycling of materials have a lower impact on the environment by saving resources and decreasing landfill. The three concepts are the three R’s, to reduce, reuse and recycle. The traditional concept of a linear process is transformed into a circular one, incorporating circular design. When designing for recycling, additional considerations have to be made, such as material content and product accessories; i.e., there are difficulties in recycling products according to a separation of different materials and accessories such as buttons or labels. Therefore, the design process can already focus on design for circularity by, e.g., replacing button closures with alternative closing designs or leather labels with printed versions.

Besides old clothing from e.g. manufacturing scraps, also other materials can be used in the fashion design such as bottles and tyres [7]. Most prominent example is the recycling of truck canvas by the Swiss company FREITAG, selling backpacks, bags and other accessories made from recycled material such as old truck canvas, safety belts or bicycle tubes [17]. Using this concept, the brand offers unique designs and creates a lifestyle product with more value. Other companies worldwide are adopting similar concepts. Examples are the Romanian brand upside-down, selling products Made in Romania and reusing materials such as from old outdoor advertising banners and billboards [18]. Or, another example is the Turkish brand %100 ISTANBUL, which sells upcycled bags in their concept store made from recycled seed or food sacks and also exhibition banners and others [19].

Another prominent example is the German sports brand Adidas and the launch of Parley for the Oceans, using recycled ocean plastic for their products [20]. Besides sneakers, also swimwear
products are offered, made from upcycled fishing nets and debris; the design of the products is inspired by the sea, using blue colours and the wave structures among others. On the one hand, especially when it comes to performing products, the quality has to be ensured. Recycled products have been seen to cause the problem of trust in quality. In the luxury sector, research revealed that the consumer perception of the products made from recycled materials is negative [21].

3.2.3. Vintage and second-hand. These practices are offering a unique fashion to consumers. Consumers can have nostalgic emotions towards them and require different styles than those available on the current market. Moreover, due to cost reasons, the second-hand options are desirable, especially for price-conscious consumers or those with lower incomes, such as students. For specific types of clothing such as children wear, second-hand clothing is preferred as children grow fast and require bigger sized garments. Other alternative models or approaches offer clothing that customers can rent, share, lease, or switch.

3.2.4. Clean technologies. Besides information technologies [22], companies focus on the improvement of product processes, e.g., using less water during dyeing or using natural dyes, i.e., vegetable and plant dyes. Also, social cause care is included, by basing dying on traditional methods. In this context, companies are working with a non-profit organisation to develop sustainable community-based projects.

3.2.5. Green certifications. Besides the traditional design requirements, the design for green products follows certain eco standards. As mentioned before, organic cotton is well known; Besides, certifications include the fair trade of suppliers. A prominent example of certification is the GOTS (Global Organic Textile Standards) and the Fairtrade certification or Fair Wear Foundation. Also, there are country-specific certificates, such as the Bündnis für Nachhaltige Textilien from Germany; others are the Œkotex. The certifications need certain measurements accordingly, such as through the LCA (life cycle assessment).

3.2.6. Green product and process design. A green product can present one of the six in here mentioned solutions, or several or all of them. Referring to the example of organic cotton, using a single approach this means that the textile material is certified as coming from a fair trade source; but to include multiple approaches, other factors should be considered as well. These considerations include for example the dyeing, i.e., using natural dye to avoid chemical substances. Hereby the whole product becomes sustainable. Besides the product, sustainable design also applies to the packaging and services, using improved packaging and giving consumer advice on garment care such as washing with lower temperature and less often, or offering disposing services to customers, e.g., H&M and their Garment Collecting service [23]. Therefore, besides the product characteristics and the materials used, also production technologies and services should be included to define a green product to be sustainable [7]. As mentioned, consumers and their use phase have an influence on the products’ sustainability, see the following.

3.3 Sustainable fashion consumers’ needs

Consumers can be the main influencers in the design process of products, refer to the concept of consumer-centred design. Also, through their ‘pester’ power, especially in social media or through feedback systems, their opinion becomes important and can influence either positively or negatively. Environmental consumers have been seen to passively or actively promote or boycott products related to environmental issues or ethics, such as boycotting brands and products using fur or angora wool.

Therefore, the perception and decision-making process of consumers is a rising topic in research and company’s marketing departments. The research on consumer behaviour, and especially on ethics, needs a sensitive approach, due to bias in what the consumers state and how they behave; refer to the previously mentioned attitude-behaviour gap due to socially desirable answers.
Different researchers tried to define the factors that can minimise this gap. One approach is to focus not only on ethics in the product - it has been found that ethicality might not be the main purchase criteria - but also on other factors such as price and availability [24, 25]. Also, as there is a broad variety of key influence factors and buying motivations, and the function the fashion item performs varies strongly [26], two categories in product design were defined; the functional and symbolic product attributes [27], whereby the product can also own both. Concluding, besides general product features and sustainable design, emotions have to be included into the design to achieve full consumer satisfaction.

4. Conclusions
The results show that contemporary fashion design offers several solutions for the environmentally conscious consumer. However, there is a necessity for more information on both sides, for the consumer and the company related stakeholders to create real sustainable products. Evaluation tools such as LCA are helpful to determine the real value; marketing tools are necessary to promote the sustainable value towards the consumer, including traditional factors as well as contemporary evaluators such as sensory features like emotions and feeling. The presentation of the right information about the product is crucial to promote the green product; different types from several sources are available. Researchers need to consider subjective attributes and analyse according to the brand values if the product incorporates this image. This overview can benefit the future development of new solutions in sustainable clothing design, in further research the acceptance of the various concepts needs testing.

Acknowledgements
Authors would like to thank the EU doctoral program Erasmus Mundus Joint Doctorates (EMJDs) Sustainable Management and Design for Textiles (SMDTex) for the financial support of the work.

References
[1] Vogue 2015 Save the Fashion Industry, Save the World! How We Can Make a Greener Future.
[2] Ethical Fashion Show 2017 Ethical Fashion Show.
[3] Nielsen 2014 Global Survey on Corporate Social Responsibility.
[4] Joergens C 2006 Ethical fashion: myth or future trend? JFMM 10 pp 360-71
[5] Carrigan M and Attala A 2001 The myth of the ethical consumer – do ethics matter in purchase behaviour? J. Consum. Mark. 18 pp 560-78
[6] Auger P and Devinney T M 2007 Do What Consumers Say Matter? The Misalignment of Preferences with Unconstrained Ethical Intensions J. Bus. Ethics 76 pp 361-83
[7] Caniato F, Caridi M, Crippa L and Moretto A 2012 Environmental sustainability in fashion supply chains: An exploratory case based research Int. J. Prod. Econ. 135 pp 659-70
[8] New York Times 2009 Luxury-goods Makers Embrace Sustainability ed J Kahn
[9] Slow Fashion 2010 Slow Fashion Award.
[10] Chouinard Y and Brown M S 1997 Going organic converting Patagonia’s cotton product line J. Ind. Ecol. 1 pp 117-29
[11] De Brito M P, Carbone V and Meunier Blanquart C 2008 Towards a sustainable fashion retail supply chain in Europe: Organisation and performance Int. J. Prod. Econ. 114 pp 659-70
[12] Fletcher K 2008 Sustainable Fashion and Textiles: Design Journeys (London: Earthscan) pp 212
[13] Research I S 2013 Manufacturing in Britain: A Survey of Factors Affecting Growth and Performance: Industrial Systems Research
[14] Teulon H 2006 Patagonia, le succès avec ou malgré le développement durable? Entrep. Hist. 4 pp 116-34
[15] Ethnicity 2013 Les Français et la consommation responsable.
[16] Achabou M A and Dekhili S 2015 Sustainable Fashion Supply Chain Management. In: From Sourcing to Retailing, ed C Tsan-Ming and C TCE (Switzerland: Springer International Publishing) pp 168
[17] Freitag 2017 Freitag.
[18] Upside-down 2017 Upside-down.
[19] %100 ISTANBUL 2017 %100 ISTANBUL.
[20] Adidas 2017 Adidas.
[21] Achabou M and Dekhili S 2013 Luxury and sustainable development: is there a match? J. Bus. Res. 66 pp 1896-903
[22] Nieminen E, Linke M, Tobler M and Vander Becke B 2007 EU COST Action 628: life cycle assessment (LCA) of textile processing J. Clean. Prod. 15 pp 1259-70
[23] H&M 2016 H&M
[24] Sima V 2014 Green behaviour of the Romanian consumers EI-TC 3 pp 77-89
[25] Greenpeace 2015 Wegwerfware Kleidung Repräsentative Greenpeace-Umfrage zu Kaufverhalten, Trageduaer und der Entsorgung von Mode. (Hamburg: Greenpeace e.V.)
[26] Niinimäki K 2010 Eco-clothing, consumer identity and ideology Sustainable Development 18 pp 150-62
[27] Birtwistle G and Tsim C 2005 Consumer purchasing behaviour: an investigation of the UK mature women’s clothing market JCB 4 pp 453-64