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CONTRIBUTION TO AN EFFICIENT TRANSMISSION OF INFORMATION TO THE TEXTILE FASHION CONSUMER AND THE INFLUENCE IN SUSTAINABLE ATTITUDES

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ABSTRACT

The concepts involved in sustainable textile fashion, demanding good knowledge about raw materials, processes, end use properties and circuits amongst others, are able to determine the way the textile product is designed and the behavior of the consumer, regarding life style and buying decisions. The textile product`s life integrates raw materials, their processing, distribution, use by the consumer and destination of the product after useful lifetime, this is, his complete life cycle. It is very important to recognize the power of the consumer to influence parameters related to sustainability, namely when he decides how, when and why he buys and afterwards by the attitudes taken during and after use.
The conscious act of consumption involves ethical, ecological and technical knowledge in which the concern is overall lifecycle of the fashion product and not exclusively aesthetic and symbolic values strongly related with its ephemeral nature.
The present work proposes the classification of textile products by means of an innovative label aiming to establish a rating related to the Life of Fashion Products, by using parameters considered with especial impact in lifecycle, as textile fibers, processing conditions, generated wastes, commercialization circuits, durability and cleaning procedures. This label for sustainable fashion products aims to assist the stakeholders with informed attitudes and correct decisions in order to promote the objectives of sustainable fashion near designers, consumers and industrial experts.

Keywords: Textile Fashion, Sustainability, Consumer, Communication, Ecological Label

THE PROCESS OF CREATION OF TEXTILE FASHION

The work involved into making textile fashion to be purchased by a huge amount of consumers all over the world is almost unknown and out of comprehension of the public. This means a wide gamut of activities and a very large involvement of raw materials, processes, technologies and decisions from designers, industrial engineers, and finally buyers.

Research and development form the basis of an evolution towards a new model of work for concept and textile product construction, where the knowledge about raw materials namely fibers, the processing into yarns and fabrics, the finishing treatments, the packaging operation, the circuit of distribution, amongst others, must be reflected in the sustainable nature of the final product. The form and value of the relevant information given to designers, technicians, industrials, retailers and finally the consumer is discussed, aiming to influence sustainable decisions including the attitude at the buying moment and even a new life style.

Inputs for the sustainability in fashion design

According to Manzini and Vezzoli (2002), Design for Sustainability result in products with high social quality with minimum waste and damage to nature producing positive impacts on society and environment. Therefore, methods for the development of a sustainable product should be associated with Life Cycle Design (Vezzoli 2008). Companies that eager to offer customers a sustainable textile product should, in the pre-production and production phases, select textile fibers or mixtures which are organic and sustainably produced, and choose optimized materials processing technologies that reduce levels of solid waste and effluents that are eliminated through the water, such as products used in washing and cleaning, printing or dyeing. In the production phase, the company must excel to maintain the labor laws demanded standards, to preserve the social welfare and to ensure respect for workers' rights. The best available techniques should be chosen in order to ensure the reduction of the impact of production process. The value assigned to the product must be opposed to the so called textile trash that has been widely produced in order to make the final product cheaper, choosing low-cost raw materials and a disqualified production process. In the distribution phase, the package must be biodegradable and, as far as possible, gradually minimized. Furthermore, with the lack of geographical boundaries, the products travel thousands of kilometers during their industrialization and distribution, causing very high levels of pollution and high fuel consumption, which will vary according to the chosen way of transportation. The destination of the product at the end of its useful life, if properly planned, can be used in part or totally to the confection of other products and restart another cycle. It becomes imperative the choice of more easily biodegradable materials, that tend to have a life cycle more compatible with the rules of respect for the preservation of the environment. (Refosco, 2011)

The design project, building a new sustainable approach, tends to create new opportunities and approaches, with the challenge of minimizing the impacts of production and consumption to sustainability of the planet (Fuad-Luke 2004). Some argue that design is remarkably tied to aesthetic functions, fashion and style, in detriment of the sustainable aspects, showing a lack of commitment to ecological concepts.

The fast fashion is situated between the luxury market and the mass market and offers products with short life cycles. It aims to achieve an insatiable public, informed, lacking in novelty and variety. Usually, fast fashion is based in chains of stores worldwide, with

several brands commercialized. The products can be industrialized in their own units or even produced in underdeveloped countries. An efficient system of production and distribution is settled and quickly spray the new products around the world, causing the impression that there is a small supply of products by model. In addition, the clothes are made with low production costs without prioritizing aspects of quality of raw materials and finishing, factory conditions and the distance that the product travels throughout the life cycle. Fast fashion is being challenged by a new contradictory movement, the slow fashion. It is a concept that derives from slow design connected to the deceleration of fashion, with perennial pieces, and aesthetically absorbed in more than one season. It is antagonistic to the impersonal and uniform products offered by fast fashion. It's a classic and durable fashion, therefore with higher quality. Another important factor is the respect for ethical and organic sources, trying to preserve local traditions. This is a different approach in which all stakeholders in the production cycle are more aware of the impacts of the products on workers, communities and ecosystems. (Refosco, Oenning, Carneiro 2011) In addition, the time factor does not weight as much because the planning is done in long term, avoiding subcontracting, temporary workers or overtime to rush urgent production (Fletcher 2008). So, consumers will be provided with timeless and long life cycle pieces, which bring the certainty of an environmental protection policy.
The challenge is obviously very hard, because it confronts an important and successful business paradigm of very fast moving fashion, with high financial results, offering regular quality products at competitive prices, launched in very short periods of time with more than twelve collections annually, in absolute contrast with the definition of an environmental sustainable lifecycle of the fashion product.

Decision about ecological and sustainable nature of a textile fiber

The answers to very precise questions about textile fibers are shown as an example of how to collect important data to take well informed decisions. The discussion should be made considering different aspects: environmental impacts, energy consumption, and use of natural resources, ability to be reused, recycled or biodegradable.

ORGANIC VERSUS NATURAL AND NATURAL VERSUS SYNTHETIC FIBERS

The use of natural cellulosic fibers has significant impact on the environment. Cotton, the most representative fiber of this group certainly due to a very convenient set of properties, requires enormous amounts of pesticides and water during the cultivation. Their preparation, dyeing and finishing require large amounts of water, chemicals and energy. Environmentally speaking, “organic or biologic” fibers are in general considered much better than conventional natural fibers due to the absence of chemicals in cultivation and processing. In terms of Global Warming Potential expressed in CO_2 emissions, as a Life Cycle Analysis component, organic cotton is 46% better, according to a study of the group Textile Exchange. (Textile Exchange 2014) However, organic cotton is identical to conventional cotton in terms of quality and performance, but more expensive and so needing some kind of conscious attitude of the consumers towards the problem of the impact of fibers in ecological terms.
The recycled cotton fabrics are generally a bit weaker and a bit shaggier than virgin fiber equivalents but with sufficient quality for some applications. Similar approach can be made for recycled wool fabrics. They are not as smooth as virgin wool fabrics, but they are interesting for many end uses. Recycling must be evaluated and used whenever this option is possible.
Viscose and bamboo artificial fibers are made by renewable raw material, are biodegradable, with low durability and difficult to be recycled. The problem of bamboo

forests destruction is mandatory as a reflexion subject. Besides, their production releases toxic gases, CS_2 and H_2S. Nevertheless, the solutions coming up of other artificial cellulosic fibers like Tencel or Lyocel can be regarded as much more ecological even when compared with natural fibers, in despite of low durability of the final product because a reusable solvent is used instead of hazardous solubilization of cellulose.
The production of synthetic fibers depends on non-renewable resources. Their discharge has strong impact on the environment since they are not biodegradable. Nevertheless, polyester has a great potential for PET recycling, mainly from bottles, and the difference between recycled and original polyester is almost undetectable, which is a huge opportunity to get lower environmental impact. As polyester, polyamide has high durability, is a non-biodegradable fiber and his production has high environmental impact due to toxic emissions release. Despite the higher energy consumption for fiber production when compared to the natural fibers, this problem is offset throughout the life of the article by the less waste in the chain and the possibility to produce products with much easier maintenance (washing easier, faster drying and no ironing). When the comparison of synthetics is made with conventional cotton, the chemicals and water spent during cultivation have a deep negative impact, although the organic fibers can make a big difference in reducing the environmental footprint of a product or textile collection. However, the criterion of choice is normally based on performance and aesthetic needs. Depending on the application, there is a different selection of suitable fibers to be chosen, making absolute sense to look for low-impact alternatives, such as organic or recycled fibers, or even to biosynthetic fibrous solutions being the price and availability other important questions to be put.
Blends of fibers can contribute to balance properties and environmental footprint, and the challenge is now to develop new yarns, fabrics and other textile materials having in mind the minimization of impact, controlling price and technical properties by means of their equilibrated fibrous composition.

The investment to reduce ecological impact of textile processing

The impact of textile wet processing must be highly considered and efforts must be made in order to alert to important changes in industrial processes, deserving investment and research. The technical information must be very close to product´s design, because it means a way to have a deep knowledge of impact factors and how to control them. (Refosco 2012)

The best available techniques in textile wet processing are promoted in governmental documents as for example in Portugal, Spain or Brazil, (Roque 2005), (Canales 2004), (Bastian & Rocco 2009), namely integrating restrictions to the use of hazardous products, selection of industrial equipments and processes, control of emissions, or savings of water and energy, such as:

- Information and training of professionals about good environmental practices;
- Adequate conditions of the machinery;
- Good stocking and dispensing conditions of chemical products, dyes and printing pastes in order to guarantee workers safety;
- Complete characterization of textile fibers, yarns, fabrics, knitted fabrics, in order to adopt convenient processes for the removal of added impurities like lubricants and sizing agents;
- Selection of biodegradable auxiliaries as for example, wetting agents, detergents, complexing and anti-foaming products;
- Use of equipment with reduced liquor ratio;

- Re-use of cooling and rinse waters as processing waters;
- Use of heat recovery systems in effluents;
- Washing of wool with recoverable organic solvents replacing detergents
- Combination of cotton preparation steps as desizing, alkaline treatment and bleaching;
- Option for enzymatic processes for the preparation of natural fibers;
- Recovery and re-use of sizing agents by ultra-filtration processes;
- Use of hydrogen peroxide as bleaching agent;
- Re-use of alkaline baths from cotton mercerization
- Selection of machines with water filling control, systems to minimize heat losses, and adequate size regarding batch size;
- Use of washing processes with minimum water consumption;
- Implementation of faster dyeing processes;
- Use of high yield dyes, without ecological restrictions to their use;
- Minimization of printing pastes volume and their re-use;
- Use of digital printing techniques;
- Minimization of energy consumption in drying machines and stenters;
- Use of formaldehyde-free finishing agents with low emission of volatile products
- Use of plasmatic discharge and other radiation techniques in order to get advantages in preparation, dyeing, printing and finishing;
- Use of finishing nanotechnology in order to get more efficiency.

These topics include a large amount of technical possibilities available for the enterprises which aim to invest in sustainable production ways, and so obtaining final products with lower environmental impact. The attention of the producers must be focused in the integral control of raw materials and processes, without forgetting the dynamic of research and development, in order to take the right decisions and prepare the enterprise for the risk of the adoption of emergent techniques in one given moment, but conventional and established in the following moment as it is the case of enzymatic textile processing, irradiation techniques or nanotechnology.

STRATEGIES TO GET AN INFORMED CONSUMER

The proposal of this work is to get a better information level transmitted to the final consumer, in order to allow a conscious decision at the buying moment. Nevertheless, the aim would be incomplete if all the stakeholders in design and production of the textile fashion product wouldn`t be aware of technical data concerning origin and properties of raw materials, description of processes and equipment, geography of the production and distribution circuits. Designers, industrial technicians and retailers must be informed about sustainability items described in manuals, conceived to be a tool for informed design, production and distribution. The textile fashion project is shared, followed and fully understood, especially in what concerns all the sustainability parameters. These manuals must be simple, accessible to different categories of stakeholders and clearly explaining the concept of sustainability related to textile fashion products.

FASHION ECO-LABELING FOR FINAL CONSUMERS

The following aspects were considered in order to illustrate the degree of sustainability of a fashion textile product: certification of raw materials, certification of industrial processing, wastes generated in clothing manufacture, Global Warming Potential in Life Cycle Analysis (CO_2 emissions) related to the complete production and circuit, durability of the product,

type of maintenance during use and life post-use (Refosco 2012). These seven parameters can be summarized as follows, taking a textile product as jeans 100% cotton, as an example:

- Raw materials can be certified to ensure that they are free of harmful substances and produced using fair and collaborative means concerning local communities. This certification can be as GOTS system or Öeko-Tex® Standard 100.
- Environmentally friendly production can be certified with labels as Öeko-Tex® 1000.
- Generation of wastes in clothing manufacture is evaluated being zero wastes the objective to get sustainability of fashion products.
- Global Warming Potential is evaluated by means of CO_2 emission integrated in Life Cycle Analysis of the fashion product during production, distribution, use and post-use, where the distances traveled by raw materials and final product will be evaluated and the incorporation of the best available techniques in processing will be taken in due account.
- Durability of the fashion product involves timeless design and also a fibrous composition able to guarantee long use.
- Maintenance of the fashion product will be considered more favorable and consistent with a good rate if it demands easy washing and ironing.
- Life post-use of the fashion product is programmed and a new life cycle begins, being the enterprise responsible for this follow-up.

Table 1 – Definition of criteria for ecological labelling of textile products

	A	B	C	D
Raw materials	With ecological certification	With ecological certification	Sustainable raw materials without certification	Conventional raw materials without certification
Industrial processing	With ecological certification	With ecological certification	Without certification	Without certification
Solid wastes (clothing manufacturing)	Zero waste - 5%	5 - 10%	10 - 15%	More than 20%
CO_2 emission (a scale must be defined)	*	**	***	****
Durability	5 years or more	Up to 3,5 years	Up to 2 years	Up to 1 year
Maintenance during use	Strategy for water and energy savings	Strategy for water and energy savings	No plan for water and energy savings	No plan for water and energy savings
Post-use	New product and new cycle	New product and new cycle	Donation	Waste

When a piece of jeans, a textile fashion product, is classified as class A using the Ecological Fashion Label criteria (table 1), certification GOTS (Global Organic Textile Standard) or equivalent is attributed, the textile processing is certified by Öeko-Tex® Standard 1000 or equivalent, approximately zero waste is generated in clothing

manufacture, the model has a classic timeless design with a durability prevision of five years or more, it will be washed once a week without ironing in order to save energy and water during use, in post-use a partnership is formed in order to receive back old used jeans and children`s tennis will be produced to enter a new life cycle, being CO_2 emission calculated for a circulation of raw materials inferior to 5.000 km, textile processing integrating 80% of Best Available Techniques and the distribution of the product until the final consumer being confined to a perimeter up to 2.000 km.

The label will incorporate the ecological classification directly resulting of the seven criteria. These will be graphically explained, being easy to read and presenting an attractive design in order to get the attention of the consumer who will absorb a lot of useful information and so, will be able to think, reflect and finally decide with much more conscience of the role he plays in the future of our planet.

CONCLUSIONS

This work intends to contribute to get a new paradigm: to design, to produce, to sell, and to buy, to use, re-use or discard being fully aware of overall ecological impact of textile fashion products.

It is important that concepts concerning sustainable textile fashion become perfectly understood and absorbed by stakeholders of creation, production and consuming, so generating mutual influences and diffusion of ecological objectives. The fashion product begins with design decisions, goes through the selection of raw materials, textile processes and circuits of distribution until the buying moment where the product influences the consumer and drives him to a decision. This works intends to improve the communicational link between the fashion product and the consumer in order to transform the buying action into a reflexive option with impact in further attitudes of the consumer during the use and post-use of the product. The life cycle of the product involves the team who creates it, who produces it, who distributes it, who buys, who uses and decides what will be the end of it. The connection must be established and surely is the guarantee to have logic behind the fashion product supporting its good or bad ecological position.
The consumer has a determinant role in what regards the sustainability of the planet when he uses his rationality and conscious of duty to decide what to buy and what to do after the useful life of the product. The conscious consumer proposes more human and sustainable values, for whom the concern at the buying moment exceeds the ephemeral nature of a conventional fashion product and becomes really interested in the impact of the entire life cycle of the product. The consumer will act as a link to diffuse the message of environmental sustainability in textile fashion.
As an important result of this analysis, a tool has been proposed to be offered to the consumer in order to facilitate a conscious decision. An ecological label with four levels has been constructed using seven criteria, namely certification of raw materials, certification of textile processing, generation of wastes in clothing manufacturing, emission of CO_2 during entire life of the product, its durability, type of maintenance during use and destination after use. This proposal integrates ecological information which can be comparable and universal, able to give the consumer the knowledge about the investment made towards environmental sustainability of the fashion product. So, the consumer assumes an ecological compromise, acts in conformity, diffuses the information and at term will positively influence the success of ecological fashion products.

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