« BEEHIVE» - SUSTAINABLE METHODOLOGY FOR FASHION DESIGN

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Abstract: The proposal methodology tends to close the “product fashion cycle”, defending the existence of a good waste management policy, so that the clothing are thrown away can be reused or recycled to come back again as material to produce yarn, fabric or knit. Subsequently these materials should be include in the production of sustainable apparel, whose design methodologies should be concerned in providing more durable garments and being possible to transform according to the occasion and the user. With that manner, the Fashion Design Process will be different in all stages of working and according with all stages of the fashion product lifespan. We will present a model with many methodologies to solve different types of problems that will be considered across the Lifecycle in Fashion Clothing.

Key words: Sustainable, fashion, life-cycle.

1. Introduction

Fashion belongs to the most deep inside of our being, it guides our mood and our way of life, being "the mirror of our habits" (Dorflies, 1984). It is an important phenomenon because it represents the expression of personal or collective identity and exists for everyone, even for those who doesn’t care (Craik, 1993). Currently, the general signs of clothing are unstable because the different style trends originate complex derivations of significant (Baldini, 2006). Only the garments who were dressed up once, on special occasions like a wedding or christening baptism, have significant and distinctly stable meanings due to the added emotional value they carry out.

Therefore, the fashion system is very strong because it covers two strong economic powers, the textile and garment industry, that employ millions of people around the world. These are also the most polluting industries displaying a situation that becomes increasingly worse with the growth that have taken.

Rethink the fashion design and considering more sustainable methodologies of work is the intention of this research work.

1.1 Goal of work

To be aware of pollution that comes from the textile and garment industry it requires not only the implementation of new regulations in waste management, but a merging of creative and conscious solutions made by designers and industrial entrepreneurs. A sustainable garment supply chain depends on the assessment environmental impact in each phase from designer’s project. However it is extremely difficult to evaluate it because relevant factors such as transport costs of the products, the raw materials costs, maintenance, disposal, etc. are far from being simple (Schultz, 2010). The way of designer working in most industrial sectors is not compatible with that. Generally he works in an isolated team of production, modeling, and sales, where retailers decide and select the products that will be placed in its stores. This
system excludes the opportunity of the designer interact and supervise the product that he drew since the beginning until the end of the "Life Cycle Design" (Vezzoli & Manzini, 2008).

Using a "Considerate Design" (or Rethink Design), the term is used by Scandinavian scholars; we intend that a "holistic system of production-consumption" with zero waste methodologies among others will resolve that.

2. State of art

To optimize the durability of products and to predict their re-use and recycling is a requirement not only studied in scientific researches (Pereira, 2008) but has also taken by some companies that works with ethic, fair and ecological strategies. Most of them know that their sustainable codes are resulting in an economic benefit, may be the great reason for the market changing. Numerous solutions are visible in innovative methodologies, in the use of biodegradable materials, or in products and services ID (Identity integration solutions). Some examples of these methodologies are "A piece of Cloth-APOC", released in 1993 from Issey Miyake and Dai Fugiwara, "3D technology-Bodyscanning" which reduces energy, materials and it provides more efficient processes, especially in applications such as "Bodymetrics" which are installed in Selfridges store (London), scanning customer’s measurements and keep them on a ID card for later they can will order the style that the have liked more, "Shima Seiki" which produces a piece of clothing in a few minutes, and companies like “MeJeans” or "Nike-ID" that improve virtual services offering customizing products by the internet, etc.

All benefits of these innovations are not only ecological and ethical principles. They also offer high value-added products with high-concept of innovation and high level of Design, where the exclusivity and individuality can also be a request for consumer. The global market is increasingly claiming more and mindful of one’s responsibilities. So the definition of Design have changed too and it is no longer understood as the design and development of industrialized objects; in 2005 it was characterized by “the International Council of Society in Industrial Design” as “a creative activity whose aim is to establish the multi-faceted qualities of objects, services and their systems, including their entire life cycle”.

3. Sustainable Fashion Design

Design is to plan considering global sustainability, including environmental protection (Eco-Design), economy, equity and social cohesion, changing the focus of "to plan product design" for "to plan a function and its satisfaction". As Papanek said two decades ago, “to design sustainable items there’s need to plan necessary satisfaction with minimal resources and least possible impacts, whose purposes are dependent on the capabilities and awareness of the designer” (Papanek, 2005).

Fashion Design doesn't escape the rules. It have to plan rationally all the resources in the life cycle of a product, since the raw materials production, product production, distribution (packing, packaging, supply, transport), retail (exhibition and sale of the product) use (maintenance and utilization of objects) to its disposal.

Therefore, to produce more sustainable products, it is necessary to transform acts and ways of thinking, making the learning process more ethically and ecological fair. Eco-design tools must be introduced not only in the professional activities of Industrial Design but also in the education of future designers. As Vezzoli says: "the transition for sustainability requires radical changes in the way we produce, consume and (...) we live "(Vezzoli, 2010). I would even add that this transition requires "the way how we have to think" because it is necessary to change the values of a society where prosperity and wealth is measured by the production and consumption of goods for a society where quality of life is measured by the individuals valorization and by the reduction of material goods.
Design should operate at the level of innovation in the overall system by promoting and developing networked, considering all actors are involved and integrating the concepts of "cycle of life", "functionality" and "eco-efficiency".

3.1 Life Cycle Assessment
The "Life Cycle Assessment" was credited and internationally recognized by SETAC (a Society for Environmental Technology and Chemistry, was founded in 1979 in USA to promote Environmental Quality through Science). LCA is a method to evaluate environmental impacts, public health and natural resource consumption, which are caused by the life-cycle processes of products or services. It involves the exchange of imputs and outputs between nature and production processes which are being evaluated, interpreting the different phases of Life Cycle.

DEFRA is a UK governmental Department, responsabile for policy and regulations on Environmental, Food and Rural issues which priorities are to grow the rural economy, improve the environment and safeguard animal and plant health. Therefore, to improve the clothing performance in the United Kingdom, they developed an action plan named “Sustainable Clothing Roadmap” that is based on the idea that Design should mediate the garment circuit (Morley et al., 2009).

The following picture illustrates all the social and/or environmental impacts during the fashion product life cycle.

Figure 1: "Sustainable Clothing Action Plan." Source: Designed from Department for Environment, Food and Rural Affairs, [DEFRA, 2008].

3.1.1 Evaluation methods
In spite of the fashion can be planned and evaluated according to the conventional product design processes, such as Eco-Design Pilot or with MDS (Method for System Design for Sustainability), there is a model recently studied for high fashion which include numerous methodologies that can minimize the environmental impact across this product Life Cycle. Lawson says that the designer should have thoughts in two lines, one of that reflects the product development and the other one makes simultaneously this
development sustainable (Gwilt, 2011). However, this method has been feasible on the Haute Couture working model, as shown figure 2 where the designer plays an essential role in the collection development in contrast to the industrial designer working.

![Figure 2: "Lawson’s Methodology applied in Haute Couture" Source: (Gwilt & T. Rissanen, 2011).](image)

Lawson’s Methodology can be a basis to transform fashion brands working. Even Industrial ones couldn’t do the same process because their big market, they should think to change their working methods and be more transparent at all stages of Product, for a better Environment and Social conditions.

Life Cycle Assessment does not cover itself the economic aspects and services. It is necessary to incorporate the criteria of efficiency and functionality to produce more and better.

3.2 Eco-efficiency
A simple manner to incorporate efficiency criteria, covering economic aspects, in order to produce more and better, is to use fewer resources and less waste in a fashion design project.

3.3 Functionality
The functionality or the "functional unit" involve all processes are used to satisfy a function. In Fashion it is dependable on materials characteristics which fabrics are produced as well as the way clothes are made. However, in Sustainable Fashion is not easy to treat because the products that are composed by multilayers can have a better performance but its reuse or recycle are harmful environmental compromised.

4. Proposal for Sustainable Fashion Design Process
We propose a Sustainable Fashion Design Process that closes the “product fashion cycle”, making less waste and increasing more resources opportunities. With a good waste management policy, we defend that the clothing are thrown away by consumer after use can be reused or recycled and return back to the fashion circuit as resource material. Although being possible to produce nonwoven textiles, the textile waste can produce yarn and subsequently fabric or knit too.
Apart from this, all the methodologies of the Design Process should also be concerned to increase the garment lifespan, as providing more durable garments or transformable clothing producing, being possible to modify according to the occasion and the user.

According with "Functional Hierarchy of Life Cycle Design Strategies" from Vezzoli and Manzini theory (Vezzoli & Manzini, 2008), the proposal of Fashion Design Process will be different in the first stage of working, especially on “minimizing resources” or "selection of low-impact resources" (figure 3). Instead of buying new fabrics, the designer will be restricted to the available recycling materials to produce his sustainable models.

![Functional Hierarchy of Life Cycle Design Strategies](image)

**Figure 3:** "Functional Hierarchy of Life Cycle Design Strategies" from Vezzoli and Manzini comparing with new principles of proposal methodology (Vezzoli & Manzini, 2008).

### 4.1 BEHIVE – A Sustainable Methodology for Fashion Design

The sustainable model (figure 4) has many methodologies to solve different types of problems that were considered across the Lifecycle in Fashion Clothing. For its realization we took into account the principles were taken by the Forum For Future (FFF, 2007), Vezzoli (2010) and Lawson (2012).

As an intermediary and having a key role in all stages of the Life Cycle, the designer helps to optimize whole system that, despite being difficult, is not impossible.

In addition to the generic chain methodologies, we are considering more specific principles to create distinctive clothing to suit personally the consumer. The garments can be multifunctional and modular in order to maximize the materials lifetime and they are possible to repair or adjust them over the time.

Part of methodologies can be described as:

In "Design for Disassembly" the designer should use biodegradable or simple composites materials instead of using fibers mixture and try to make clothing where its components can easily be removed;

In "Design for waste management" the designer must incorporate the "Zero Waste" production (taking into account the "puzzles" modeling techniques) and the waste reusable in manufacturing (including Upcycling waste in Fashion and Refashion);

In the "Design for Social Well-Being" the possibility of incorporating the history of products, introducing instruction manuals (in multifunctional products, for example) or certify them with ecological seals valuing them as luxury goods, it promotes not only the transparency between the production chain (providing fair wages to workers too) as well as it may be the best result for a collaborative Design between all stakeholders;

In the "Design for Slower Consumption" the quality of the garment must be developed by the good embellishments and larges seams to allow simple changes and according to the transformation of the people body. A multi-functionality modeling leads to reduce the consumption too and “hire garment rather than buy” is also another form to combat obsolescence;
In the "Design for User Participation" there is a more affective relationship between the consumer/user and producer. It can be made with systems “Do-it-yourself” garments, having the potential to change not only the function but also other fashion design elements, as silhouette, line and texture;

"Design for Product-Services System" is important because it enables customer loyalty. To increase the use of fashion clothing it should be possible to include repair-services of clothing, as well as clothing rental and laundry services;

The "Design for end-of-Life strategies" aims to strengthen local resources in a system that promotes the local economy. When the recycling or reuse of materials could not be performed on a large scale it would implement other methods to help the collecting and the future revalue. Some of them, among others, could be the delivery of discarded textiles to associations of art and craft, involving people in risk situations, elderly or disabled people as a therapeutically method.

Figure 4: Behive - A sustainable methodology for fashion design

Final Considerations

If Fashion Designer have to plan rationally all the resources in the product life cycle, since the raw materials production, product production, distribution, retail, use until disposal, "Behive“ strategies that were

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exposed will help him to solve all project concepts to get back his work into more sustainable way. Even so, we think some methodologies are more complex than others, specially in the use of recycling materials, that is no common to use. However, according to Morais (2013) we know that is possible to make recycling cotton thread and recycling wool thread, since they were produce until 50 % of discarded material and mix with virgin material fiber. In addition to that it is also possible to refashion discarded materials and reuse that in Fashion Cycle.

After all, comparing “Product Life Cycle” (above sequence) and the “Fashion Cycle” (bottom Sequence) in Figure 5 we will see the methodologies from “Beehive” integrated in “Design Process” and “Materials production”. Having a good policy of waste management, where materials from Design Process might come from discarded textiles, it will be possible close the Fashion Cycle and become Design more Sustainable.
Figure 5: "Behive" sustainable methodologies integrated in Fashion Design Process.

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References


