Discussion on the Strategy of Sustainable Design of Garments—Taking Patagonia as an Example

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Abstract. This paper hopes to improve the life cycle of clothing through sustainable design, optimize the use of materials and finally realize the sustainable development of environment, economy and society. Starting from the concept of sustainable design, this paper points out that the sustainable design emphasizes the environmental protection, health and other sustainable requirements as the design goal. Under the premise of satisfying the ecological index, the effective sustainable clothing design is mainly embodied in two points: first, to achieve the requirements of sustainable design in all aspects of apparel production, to reduce pollution and waste, the second is to excavate the surplus value of old clothes in the recycling link, so as to make sustainable reuse.

Sustainable Design Concept

The Origins and Development of Sustainable Design

Design is a kind of creative activities, its direct purpose is to excavate people's needs, and people's demand into products, so that consumers through the product directly feel the concept of design, resulting in the desire to consume. Sustainable design is more focused on sustainable development. A series of discussions were conducted in 1972 on the relationship between environmental issues and economic development in the "United nations Conference on the Human Environment" The term Sustainable (sustainable) was used for the first time. In 1987, the report of the World Commission on Environment and Development defined sustainability as: integration of economic, social and environmental patterns. With the development of social sustainability from the initial environmental protection gradually developed into a variety of values and functions as the goal of the term. The concept of sustainability has broadened to become an act and a norm for improving the lives of the present and future human beings by social awareness and the all-round and responsible development of humankind itself. Sustainability is a standard for comprehensive evaluation based on economic, social and ecological aspects, involving economic prosperity, environmental management and social responsibility.

The concept of sustainable design dates back to the 1950, and is made up of Fuller, Pananek and other designers who are influenced by scholars and environmentalists who claim the protection of the Earth's resources. But does "sustainable design" mean that other designs are unsustainable. According to Chapman and Gant (2007), 100's sustainability may not be the most effective way to build a problem. On the contrary, it may be an important first step to keep all stakeholders informed of the extent of sustainable development, which requires the introduction of sustainable assessment tools: eco-indices.

Eco-Index is an environmental assessment tool that can measure and measure sustainable practices in the product lifecycle, including clothing, footwear and equipment (Eco index, 2010). The goal is to create common languages and standards to communicate with product-level sustainability throughout the supply chain. Eco-Indices are the framework for some outdoor product brands and retailers, such as Timberland, Patagonia, North Face and Levi Strauss Co. Eco-indices are concerned with the
environmental aspects of clothing production and consumption. According to Stegall (2006), this lack of focus on product physics is unaware of the intrinsic link between behavior and results. Adding a sustainable design at this point becomes a win-lose solution: not only reduces operating costs from a business perspective, improves corporate performance, but also reduces the harmful impact on the environment. Such a design would more broadly define the linkages that include environmental, social and economic factors, particularly in the context of environmental sustainability, with a greater emphasis on sustainable design.

**Implications of Sustainable Design**

The author thinks that the scope and value of sustainable design are expanding continuously, and now the sustainable design has added the environment and sociality of the time requirement on the basis of the previous research design. The concept of sustainable design is now evolving in the direction of improving the common quality of life and environmental harmony of humankind. Therefore, the author defines sustainable design as: a purposeful and practical design that can affect the clothing itself and can apply sustainable thinking to the creation and process of clothing.

Clothing is a combination of material and spirit, emphasizing clothing on the health and decorative role of the human body, while emphasizing the sustainable design of clothing properties. The combination of sustainability and costume design does not mean that the previous design is unsustainable, but on the existing basis of environmental protection, health, landscaping also as one of the goals of sustainable design, so that clothing products to meet market demand can also be sustained and healthy development. Under the premise of satisfying the ecological index, effective sustainable clothing design has two main points: one is to achieve the requirements of sustainable design in all aspects of garment production, reduce pollution and waste; Secondly, after the garment product completes its mission from production to use, the surplus value of old clothes is excavated in the recycling link, Sustainable reuse. This paper mainly takes Patagonia as an example to reflect the strategy and application of sustainable design in all aspects of the enterprise. It is hoped that through the implementation of sustainable design to improve the life cycle of clothing, optimize the use of materials, the use of local resources to emphasize environmental and economic coordination, and ultimately achieve environmental, economic and social sustainable development.

**The Analysis of Sustainable Design Strategy of Patagonia in Every Link of Enterprise**

Patagonia as a sports apparel production, sales of brand enterprises, after market research, marketing planning, product design, such as comprehensive analysis, and then after the purchase of cloth, tailoring, sewing, quality inspection and other processes, transport to the store for sale. Then the sales and consumer feedback collected feedback to the planning department, the decision to develop the next type of clothing basis. In order to achieve the sustainability of the product from cradle to Cradle, Patagonia company has penetrated the concept of sustainability into the design, processing and marketing stages of the entire product.

**Environmental Priority Strategy**

In the design of apparel products, production, sales and other links will have an impact on the environment, in the garment design process enterprises should be renewable, environmental protection, efficient and as long as possible to prolong the service life as a guide, that is, the view mentioned above: should be as far as possible to reduce environmental damage, design to sell consumers satisfied with clothing. Patagonia in the design and manufacture of products, the highest priority is the manufacture of durable, high-quality products to achieve maximum performance. The Company believes that quality is the most important environmental attribute of the product and should give priority to quality in order to produce products of low damage.

Patagonia's idea for sustainability is to "create better products, avoid unnecessary environmental damage, and find solutions to environmental crises through business operations". Patagonia's
behavioral changes have been made through the design of high-quality products such as increased durability, functional and non-obsoleste, design easy to repair and products made from reusable or recycled materials, design products with minimal impact in the entire supply chain, including resource acquisition, manufacturing and transportation-water, water, Energy use, greenhouse gas emissions, use of chemicals, use of toxic substances and emissions of wastes. The Company believes that only increased contributions and the continued scope and scale of contributions can make the actions and initiatives that are upheld a reality. Through 1 of the Earth tax, charities and enterprises, consumers and non-profit organizations are closely linked, so that each enterprise, individual behavior for the "Environmental revolution" action, such as enterprises in 2017 for the protection of the environment of non-profit law firms and grassroots environmental organizations allocated 445000 dollars, it can be seen that Patagonia has been achieving sustainable development through various actions and contributions.

**Strategies for the Use of Diverse Apparel Materials**

With the development of Internet technology, especially in the textile industry, the demand for clothing materials is becoming more and more diverse. In order to ensure the function of clothing materials to maximize the conditions to meet people's needs of clothing, clothing materials will continue from the lower, single to advanced, diversified. The clothing material is the clothing product design material source, but the clothing material choice is also diverse. In the selection of raw materials, raw materials and their sources is the key to measuring the sustainability of a garment. The different clothing material to the clothing production and the clothing final shape effect will have certain influence. The scientific understanding and application of garment fabrics can embody the artistic design ability of costume designers, and can embody the important influence of design on garments. The famous Italian international costume designer Valentino in his costume design, through the use of stiff fabric and soft fabric contrast not only shows the overall clothing design harmonious aesthetic feeling more in the garment recycling materials to do recyclable. Through the design of different clothing materials and the combination of textiles and sustainable to create both in line with the consumer aesthetic and conducive to alleviating environmental pollution clothing.

In recent years, some well-known enterprises began to introduce recyclable materials in various production links to reduce the impact of clothing enterprises on the environment. For example, some fiber production companies have begun to use recycled textiles, clothing, and consumer and industrial waste to produce new fibers. PATAGONIA2017's annual report shows that the garments made of Patagonia are made from recycled (29) or renewable (20) sources, and 95 of the materials used are managed under the chemicals and environmental impact project of the enterprise; As shown in the following table.

<table>
<thead>
<tr>
<th>Material sources</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw Petroleum products (polyester/nylon)</td>
<td>58%</td>
<td>54%</td>
<td>51%</td>
</tr>
<tr>
<td>Recycled Materials</td>
<td>24%</td>
<td>26%</td>
<td>29%</td>
</tr>
<tr>
<td>Cotton and other Plant materials</td>
<td>15%</td>
<td>18%</td>
<td>19%</td>
</tr>
<tr>
<td>Wool and other animal Products</td>
<td>3%</td>
<td>2%</td>
<td>1%</td>
</tr>
</tbody>
</table>

From the above table can be seen from the original source of raw petroleum products from the original Patagonia from 2015-2017 to other materials supplemented by the model slowly increased the proportion of recyclable materials, the Patagonia in the selection of raw materials is based on the concept of sustainable design to choose raw materials. In Patagonia design clothing, due to the comprehensive consideration of different clothing materials, different fabric stability, different clothing weaving density, weight and the use of different modelling design, to achieve a variety of clothing design to improve the recycling of clothing, to meet the needs of consumers while reducing pollution in order to achieve the real meaning of sustainable design.
Production Transparency Strategy

Clothing production design can be quickly reflected in the apparel production enterprise system: based on the sustainable development of the enterprise from the apparel product design and production system of the subdivision, systematization, standardization, and modularity of production impact. In the Patagonia production segment, Patagonia the information provided through the website and the printed catalogue describes the representative projects of different product lines based on science and data to disclose the materials and technologies used in the production process and the impact on the environment. and addressed various issues in published articles or position papers, including the protection of recycled organic agriculture, fair wages, durable waterproofing, micro-fiber contamination, why products are produced around the world, and efforts to address the problem of micro-fiber contamination. Research shows that in the process of washing clothes will produce a lot of tiny fibers, over time accumulated in our oceans. The micro-fiber pollution is an important problem which threatens the environmental health and is being paid more and more attention by the outdoor industry. Patagonia exposes the enterprise's micro-fibre journey, as well as the gap between research and solutions, through production process design, rapid flow balance design, and data resource sharing to the process during production and the resulting fiber contamination. It also exposes where and how its products are made available to customers, non-governmental organizations and other stakeholders. Patagonia makes the design more sustainable by making transparent systems that make the process transparent.

Recycling of Fiber Environmental Protection Strategy

In modern society, many clothes are not abandoned because of the use value of zero. Although the old clothes can no longer be loved by people, it is still possible to recycle from the angle of design, excavate its surplus value, innovate and redesign, extend its life cycle. The idea of sustainable design of waste garments is to use the art design method and innovative ideas to reposition their use function on these discarded materials.

In the garment recycling, Patagonia through the waste clothing in the material and function design to ensure the environmental protection of clothing in line with the enterprise sustainable design principles and concepts. Patagonia, in partnership with the patented Japanese fiber company, has been working to use fiber-recycling systems to deal with recycled clothing, avoiding the use of these old clothing in a completely useless situation. Patagonia This project is a significant garment recycling project; the main mode of operation is through the consumer actively to the retail stores of discarded clothing by mail or shipped directly to Japan for processing. At present, the world's annual polyester fiber consumption of more than 4 tons, of which about 10,000 tons of polyester fiber is recycled. The number of polyester fibers recycled as a result of Patagonia's recycling program is further increasing.

<table>
<thead>
<tr>
<th>Financial year</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>The number of garments repaired in Reno</td>
<td>37000</td>
<td>44000</td>
<td>50295</td>
</tr>
<tr>
<td>Total cost of Reno Repairs Dept. (USD)</td>
<td>$1.85M</td>
<td>$2.2M</td>
<td>$2.92M</td>
</tr>
<tr>
<td>Number of Patagonia items recycled (IN UNITS)</td>
<td>3615</td>
<td>13902</td>
<td>17272</td>
</tr>
<tr>
<td>Worn Wear Tour attendance (US + EUROPE)</td>
<td>11075</td>
<td>9920</td>
<td>90085</td>
</tr>
<tr>
<td>Number of used items traded in (US RETAIL)</td>
<td>1584</td>
<td>1392</td>
<td>2622</td>
</tr>
</tbody>
</table>

Table 2. Patagonia Repair clothing quantity and cost.

Not only that, the Patagonia project will be able to deal with the entire garment through a specific recycling facility, and the maximum amount of other fiber recycled in the old garment can fluctuate within the 10~20 range. Compared with the raw polyester fiber, the quality of recycled polyester fiber is not inferior. The use of recycled polyester fibers has made Patagonia's projects more environmentally friendly. The polyester raw materials extracted from the old garments have significant energy saving and emission reduction effects, compared with the raw polyester production
process, the process can reduce about 76 of the energy consumption and about 71 of greenhouse gas emissions. Patagonia and Japan's recycling programs in Japan to produce more energy-saving emission reduction effect is as high as 80. Recently, Patagonia has innovated a new way of recycling: using cars to repair or recycle their products from the buyers, strengthen the recovery and after-sale service with customers, and jointly responsible for the life cycle of clothing products, including maintenance, reuse and recycling work. The following table is the number and cost of repairs to the patagonia2015-2017 year in the recovery project.

**Conclusion**

From the development process of sustainable design and the industrial chain of the textile industry, it is generally composed of the choice of fabric, the collection of natural fiber and the processing of the fiber to the product design and brand planning and sales, and the design part occupies an important position in the sustainable enterprise. In the textile industry, green and sustainable requirements need to run through the various production links, not only within the supply chain but also to fully consider the relationship between the whole supply chain and the overall coordination effect. In other words, only through the cycle of operation can make from the supply of raw materials to the final recycling can form a cycle of green logistics system. This article mainly to Patagonia enterprises as an example to illustrate that in modern consumers pay more and more attention to corporate social responsibility and environmental protection today, the sustainable development of China's domestic apparel enterprises is facing the sustainability of the design of clothing marketing requirements. In addition, the evaluation criteria for sustainable growth of enterprises are also becoming more and more diverse. It is hoped that Chinese garment enterprises can learn from the successful experience of successful and sustainable design of clothing brands abroad, and combine the relevant policy conditions in China to realize the progress of sustainable design as soon as possible, and formulate sustainable design strategies to complete the sustainable development of garment enterprises.

**Acknowledgement**


**References**


