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## **Sustainability – Green and Clean Fashion**

### 1. What is Sustainability?

To sustain means “to maintain”, “to uphold”. Sustainability is the characteristic of being able to coexist with another system indefinitely, without either system being damaged. It is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."(Brundtland Commission, 1987).

Sustainable development is about delivering a better quality of life for everyone, now and for generations to come. It aims at reducing carbon footprints of one’s activities by altering methods of design, production, transportation and consumption. Rapacious desire for convenience, comfort and economic gains has led to uncongenial human activities. Excessive use of non-biodegradable material like plastics, synthetic, metal, glass, aluminium, chemical dyes, pesticides; deforestation and pollution from vehicles and industrial units is seriously taxing the environment. Consequences are depletion of natural resources, loss of biodiversity, damage to ecosystems, rising carbon level, acid rain, climate change, greenhouse effect, global warming and various health-related problems.

Sustainability is a contemporary approach to look at the social and environmental impacts of human activities and has become a prime concern in context of the deteriorating condition of our planet. Sustainable practices involve energy conservation, zero-waste, re-use and recycling and employment of sustainable alternatives in the fields of agriculture, design, transport, technology etc. Although a completely sustainable system is difficult to exist since what we give to nature can never be equitable to what we take from it, yet sustainable solutions aim at reducing inequities and maintaining healthy economies.

Principal factors responsible for emergence of sustainability as a critical issue are-

Population: World population is growing at a rate of about 1.14%. Population estimates for 2010 and 2050 are 6.8 billion and 9.2 billion respectively. There is compelling demand for earth's natural resources which are being consumed at a fast pace. Replenishment of the same by natural or human efforts is disproportionate and also much slower.

Affluence: Modern marketplaces are characterized by abundance of wealth & material goods. Rising income levels, changing lifestyles, increasing disposable incomes and easy availability of credit is driving demand and growth in Consumer Products space.

Technology: Excessive use of modern technology & mass production techniques are resulting in uncalled-for by-products like environmental pollution, rapidly exhausting natural resources, unemployment and various health issues. Technology-driven lifestyle has mechanised human life and debilitated connections with nature.

## 2. Sustainability & Fashion – Establishing the connection

Fashion industry involves highly unsustainable practices. Fashion leaves a pollution-footprint with each step of the clothing life-cycle generating potential environmental and occupational hazards. There are major implications with reference to design, production, distribution and consumption of fashion articles. Sustainability holds significant relevance in Fashion due to the fundamental characteristics of Fashion industry:

Magnitude: Fashion industry is one of the fastest growing industries of the world. World textile and apparel trade was US\$203 billion and US\$276 billion respectively in 2005; textile trade accounting to 2% and apparel trade accounting to 2.7% of world merchandise trade(WTO Report 2006). It rose by 9.7% to US\$530 billion in 2006 and is expected to reach \$700 billion mark by 2010 with demand for apparel and woven textiles growing to about 35 million tonnes(CII-E&Y Report 2007).

Global operations: From fashion-sourcing to fashion-consumption, fashion industry is truly global. Energy consumption & carbon-emissions are major concerns during transportation of fashion products from manufacturers to distributors, to retail stores and finally to customers through a global fleet of trucks, planes and ships.

Labor-intensiveness: Fashion industry is highly labor-intensive. Approximately thirty million people are employed in the clothing industry around the world.

### 3. What is Sustainable Fashion?

Sustainable Fashion or Eco-fashion is fashion which connects with nature. It is a low-impact activity that emerges from social- and environmental-consciousness and is oriented towards people's well-being and conservation of environment.

The International Standards Organization(ISO) defines eco-fashion as “identifying the general environmental performance of a product within a product group based on its whole life-cycle in order to contribute to improvements in key environmental measures and to support sustainable consumption patterns.”

Sustainable Fashion is Green and Clean Fashion. It aims to sustain the environment through effective use of earth’s natural resources and minimizing harmful impacts of fashion products during the entire life-cycle, also known as products’ carbon footprint. It employs innovative techniques of growing, processing, treating and dyeing fibers in an eco-friendly and environmentally-responsible manner without sacrificing style, quality or profit. Green products are made from organic, pesticide-free material, without use of harmful chemicals and are recyclable or bio-degradable. Operations are kept local to reduce environmental pollution due to transportation. The entire process of going from fiber to fashion is non-metallic, non-toxic and definitely bio-degradable. Green Fashion defies animal exploitation and promotes animal-friendly designs, skin-free and fur-free collections. It ensures animal-welfare by upholding good standards during production of leather and wool.

Clean Fashion is socially-committed fashion. It considers where a product was originally made, by whom and under what conditions. It employs transparency, Fair-Trade practices, eliminates exploitation and inequities, and provides healthy work-environment and decent wages to the workers.

#### 4. Sustainable Fashion–Governing factors

Certain positive and negative factors that govern sustainability in Fashion have been identified as Encouraging Factors and Concern Factors, respectively.

### Encouraging factors

These are advantageous factors that support incorporation of sustainability in Fashion. They establish meaningful connections and feasible operational-integrity between the two.

-Fashion industry is one of the most dynamic industries in the world. Change is the essence of Fashion. Sustainability is also change-based and requires transformations in attitudes, lifestyle & processes. Thus, Fashion can be an effectual propagator of sustainability.

-Environmental-consciousness is on a rise amongst modern day consumers who care about buying brands that provide transparency about their social responsibility. Demand for eco-friendly products is increasing as shoppers are making informed choices with environmental concern before making a purchase(Walmart consumer research, April 2008). Global retail sales for organic cotton products increased 85% to \$ 1.1 billion in 2006, and approximately 83% to \$ 1.9 billion by end of 2007(Organic Exchange Organic Cotton Market Report 2007)

-Fashion is an expression. It is a timed style-statement popularized amongst masses through distinguished people of society. Fashion enormously influences people and can bring radical changes towards pro-sustainability mindsets.

-Fashion is a pleasurable activity. People like to get associated with it. It holds relevance for people of varied age-groups, socio-cultural backgrounds and professions, though its application may be implicit or explicit.

-Fashion is a buzzword among younger generations who associate with latest trends and styles in-vogue. These young, energetic people manage changes efficiently and can be effective campaigners of sustainability movement.

-Fashion works on a global platform. It can widely and effectively communicate the sustainability message.

-Fashion is an “Attitude”, a “Way of Life”. It symbolizes the choices that one daily makes. Sustainable fashion is a tool of personal well-being. It is an activity that imparts reverence & valued-meaning to the Fashion process.

-Designers have the creativity & innovation to create sustainable designs.

-Earth-friendly fashion is undergoing major transformation. It is very much trendy & stylish.

-Fashion shares with Sustainability the vital characteristic of being an on-going activity. This leads to enhanced congruence between the two.

### Concern factors

These are non-conducive or disadvantageous factors that make implementation of sustainability difficult in Fashion and intensify sustainability concerns. They emerge from the prevailing norms & practices of fashion industry such as mass-production, fast-fashion and international operations, which violate basic mantras of sustainable fashion namely Produce less, Buy less, Operate locally, Reuse & Recycle.

-Fashion means change. Fast-fashion means frequent purchases, over-consumption and discards much before realizing the useful life of fashion products. Approximately 90 million items of clothing ends up in landfill sites globally each year. Landfill is polluting the earth by extruding deadly methane gas. Unsustainable man-made fibers take longer to degrade.

-Fashion industry is closely associated with Textile Industry which is one of the most polluting industries. Approximately 8,000 chemicals are used to turn raw materials into textiles. Pesticides used for crop-protection harm wildlife, contaminate water and food products. Cotton is one of the most widely-grown and chemical-intensive crops in the world. Conventionally grown cotton uses approximately 25% of worlds' insecticides and more than 10% of worlds' pesticides. About 150 grams of pesticides and other chemicals are used to produce cotton for one t-shirt.

-Large quantity of industrial wastes and harmful effluents are released from the textile industry.

-Chemicals such as bleaches and colors for textiles are toxic and have ill-effects on workers' health.

-Two-thirds of a garment's carbon footprint occurs after it is purchased. Greenhouse gases generated during washing of clothes in warm water and machine-drying exceed carbon-emissions created during growing, manufacturing and shipping of clothing.

-Following agricultural industry, fashion industry is the second largest user of water in the world.

-Sheep, alpaca, llamas and other wool-bearing animals contribute to production of methane gas.

-Growing and harvesting of natural fibers such as cotton and hemp generally involves farm tractors and trucks which run on non-renewable fossil fuels of diesel and gasoline that release carbon-dioxide into the atmosphere.

-Oil is needed to produce man-made fibers, and most synthetic fibers are oil-based. Manufacture of Petroleum-derived synthetic fibers like polyester, nylon and "natural" man-made fibers such as lyocell and rayon, is an energy-intensive process requiring

large amounts of crude oil and releases harmful emissions which can cause respiratory disease.

-General state of workers in Fashion industry is very depressing. Main centers of apparel production are Asia, South America & Eastern Europe where wages are low and factories often do not comply with international working and environmental standards. Sweat-shop workers, who include children also, often work for longer hours in terrible conditions at meager wages.

-Animal welfare is an area of concern. Animals are kept in poor conditions for wool and are slaughtered for leather, fur and skin. Conventional silk production boils or roasts silkworm cocoons whilst still alive to obtain high-quality yarn.

##### 5. Challenges in the way of Sustainable approach to Fashion

- Sustainability itself is the biggest challenge. To be Sustainable means to return the same amount of energy or resources to the system that are exhausted, without generating pollution or waste. This is practically impossible for any process.

- Use of farm-land to produce lower yielding "all-natural" plant materials without the benefit of high-yield modern farming practices such as use of genetically modified plant strains, high nitrogen fertilizers and pesticides would mean more labor per acre, leaving an actually larger carbon footprint.

- Building a sustainability-directed mindset and re-structuring the fashion value-chain would be neither facile nor immediate. Sustainable fashion is perceived by many as a less-convincing trend that would be phased out soon or a gimmick to promote high-priced luxury goods labelled as eco-friendly. It would be an ambitious task to reshape consumers' perceptions and generate acceptability. Sustainable



development remains unclarified and intangible due to incoherent portrayal of sustainability agenda by different sources. Absence of well-defined parameters and standards for green products leads to consumer confusion about organic definitions. Conflicting desires to preserve the environment and yet to participate in materialistic consumption may pose as stubborn impediments.

- Exploring market-readiness for sustainable fashion & accelerating the same to converge Sustainable Fashion into Fashion mainstream is of cardinal significance. Market for sustainable fashion is relatively new and unexplored. Extensive market research needs to be carried out to understand market characteristics for sustainable fashion in terms of price, segmentation, positioning and so forth.

Also, managing the demand-supply gap would be challenging till operational stability is reached. Currently, industry is suffering from uneven cycles: sometimes there is too much organic cotton in the market, if farmers can't sell it, they might switch back to conventional cotton or other crops. A bigger concern is the possibility of organic cotton shortage, especially if big players, like Walmart and Patagonia, suddenly decide to buy up existing supplies.

- Sustainability agenda is expected to effect fashion industry & the entire economy in a big way.

-Fashion signifies "Change" and re-orientation of Fashion in a no-change or less-change environment is herculean. Also it would be an arduous task for designers to experiment their creativity with limited fabrics & colors that are eco-friendly.

-Sustainable fashion contradicts modern business principles of globalisation and mass production. Achieving sustainable fashion in a growing capitalist economy that

thrives on rapid technological upgrades and frequent changeovers is a big challenge. The reuse-recycle culture may impede demand for new products adversely effecting profitability & industry growth.

-Transforming the existing fashion value-chain to a Green and clean value-chain requires fundamental changes with immense time & costs implications.

-Cost of Eco-friendly fashion products is expected to go up by 10-15%. This can be attributed to increased cost of material & processes and the current scenario of low demand and scanty competition. Creating an affordable sustainable fashion is challenging.

-Pro-sustainability efforts require consistent & balanced support from government and key industrial players.

## 6. Essentials of Sustainable Fashion

Starting with a pro-sustainability mind-set sustainability in Fashion can be implemented through a four-way approach:

- Create Sustainable design
- Use Sustainable Material
- Develop Sustainable Technology
- Employ Sustainable Practices

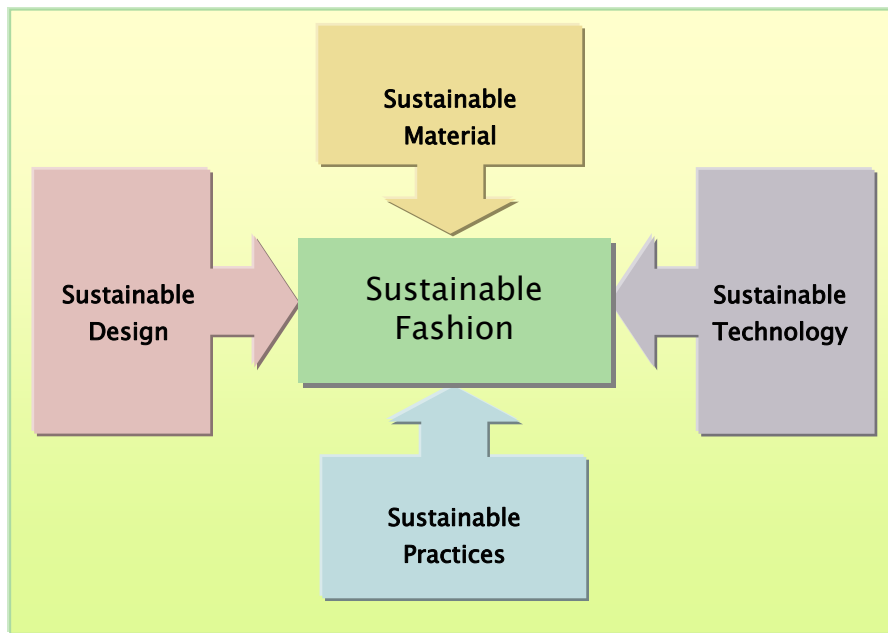


Fig.1 Essentials of Sustainable Fashion

- Sustainable Material

Sustainable Material is renewable & recyclable material, free from synthetic pesticides and chemical defoliants. It is recyclable or bio-degradable. Sustainable fibers include natural fibers, organic fibers and fibers manufactured using natural material such as Lyocell, Polylactic acid or PLA (Corn Polymer).

Natural fibers are derived from seeds, leaves and stem of plants, coats of animals coats, silkworm cocoons etc.

-Cellulose or plant fibers include cotton, Jute, Flax, Hemp, Ramie, Abaca, Soy, Banana, Pineapple, Corn, Bamboo etc.

-Protein or animal fibers comprise of sheep wool, Angora wool, Alpaca fleece, Mohair, camel hair, Cashmere, Vicuna, Silk etc.

Low impact synthetic or recyclable fibers like polyester are also used. Bamboo is being used to make water-saving fabric. There is an emerging use of innovative fibers and fabrics like-

- Eco-spun, sheepskin-like fabric made from recycled soda bottle
- Lenpur, cashmere-like fabric made from wood pulp of white pine trees
- Soya, soft cotton-like fabric made from soybeans
- Sasawashi, cotton- or linen-like naturally absorbent fabric made from kumazasa bamboo and washi, a type of rice paper
- TENCEL, derived from wood pulp by a non-toxic process
- TERRATEX, made from 100% recycled polyester(largely post-consumer plastic soda bottles) or renewable materials(such as PLA)
- Fleece made from blended hemp or post-consumer plastic(PET) soda bottles
- Ingeo, made from corn by-products

Environment-friendly accessories & embellishments are being made from natural and recycled materials like golden grass, vegetable ivory, soya, seeds, pods, coconuts, wood, sea cell, reclaimed lace and beading. Chemical dyes are being replaced with natural, eco-friendly, low-impact colors e.g. non-chlorine bleach, silicon-free softeners, azo-free, non-acidic and non-toxic dyes.

- Sustainable Design

Sustainable design is "eco-design" or "responsible-design". It is the art of designing objects in compliance with principles of economic, social and ecological sustainability. Its essential aim in context of fashion is to produce products in a way that reduces the use of non-renewable resources, minimizes environmental-impact and relates people with nature. It is an upcoming concept for creating Fashion with a difference.

- Sustainable Technology

Sustainable Fashion or Green technology demands low-impact alternative technologies that improve energy efficiency, develop renewable sources of energy,

increase use of bio-fuels, reduce pollution and make reuse/recycling possible. This eco-friendly technology can lead to sustainable solutions applicable at various stages of transforming fiber to fabric.

- Material Technology

- Yarn & Fabric technologies for weaving, printing, dyeing and finishing.

- Non-toxic or reduced-toxicity fiber processes and treatments.

- Fabric-testing to ensure absence of contaminants like nickel, lead, formaldehyde, pesticides and heavy metals.

- Stain-free and wrinkle-free fabric technologies

- Process Technology

- Operating facilities with energy sources that are constantly replenished e.g. solar, wind, landfill gas, biomass, low-impact hydroelectric facilities.

- Chemical-free processes, Zero-Harmful Emissions

- Made-to-order, Mass-customization, Body-scanning for made-to-measure, ready-to-wear, Seamless apparel technology

- Distribution & Transport Technology

- RFID to create a sustainable supply-chain for tracking, securing and managing fashion products throughout their life-cycle.

- IT Planning for enhanced efficiency of processes and improved supply-chain responsiveness.

- Minimal or environmentally-appropriate packaging using recycled and eco-friendly material.

- Consumer-use Technology

- Less frequent laundry

- Fewer garments, extended life-span

- Smart textiles & garments

- Wearable technology

- Disposal-recycling-reuse technology

- Zero-waste or effective waste-management

- Fiber-to-fiber recycling

- Refurbished or recycled fiber and fabric

- Sustainable practices

Sustainable practices refer to ethical practices and social entrepreneurship for a fair and just society. Important dimensions are fair-trade, elimination of child labor, hygienic working conditions, decent wages, employing a registered and transparent supply-chain, community development through educational programs, health-campaigns, child-aid etc.

## 7. Framework for Sustainable Fashion

Two models are proposed to develop a framework for Sustainable Fashion.

- Pente-Alpha (5α) model of Sustainable Fashion

Pente-Alpha in Greek means 5-A. It is a 5-phase Sustainability model based on 5 attributes of human behavior. These attributes, Awareness, Association,

Assimilation, Adoption and Achievement are reflected as a series of interlinked phases that progressively lead towards sustainability in fashion.

1.Awareness regarding sustainability concerns is the first step. It is important to know about the ethical, social and environmental performance of our choices and actions. Awareness about eco-consciousness & sustainability agenda through promotional programs, research articles, theme-campaigns with active involvement of designers, manufacturers and consumers can bring paradigm shift in ideologies & practices.

2.Association with current social & environmental issues is necessary to identify oneself as a key component of environment and contribute in a positive manner. This requires establishing strong connections with nature.

3.Assimilation and incorporation of innovative and sustainable technology for sustainable solutions will result in increased material choices, processing capabilities, consumer involvement, reuse & recycling approaches.

4.Adoption of changes for sustainable living involves embracing restoration efforts through a self-driven approach towards social & environmental accountability.

5.Achievement of sustainable, low-impact fashion solutions by looking-back at the activities during the entire process of need-generation to need-satisfaction and identifying the footprints.

Since, there exist serious inequities in what we receive from nature and what we return back, it becomes imperative to analyze and reduce the negative impacts and generate valued returns.

The model links the last phase, 'Achievement' to the first phase, 'Awareness' through a process of "Reverse Thinking" that implies looking-back at the impacts of our

activities. The expected or actual achievement from an activity should guide our present choices and future course of actions.

Reverse Thinking can be implemented at Product Design & Development stages where designers and manufacturers can ascertain the social & economic relevance of their products by evaluating material used, processes employed, consumption-pattern and dispose.

Fashion consumers can incorporate Reverse Thinking process at Product-buying stage through thoughtful deliberation as to how the product will be consumed and decomposed or recycled after use. This insight can make the entire process of product design & development green and clean.

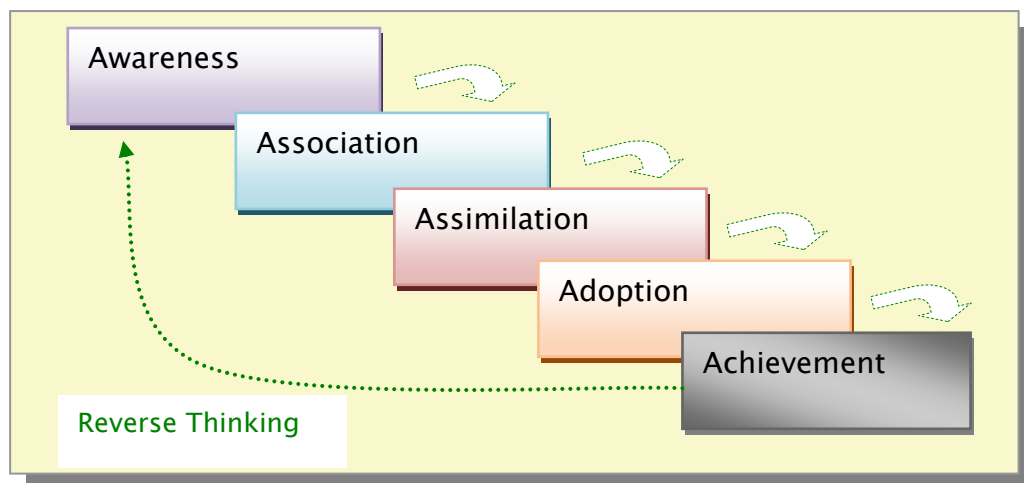


Fig.2 Pente-Alpha model of Sustainable Fashion

- 4-P Model for Sustainable Fashion

This is the Functional Model that identifies 4-Ps (People, Processes, Products, and Proceeds) as core components of Fashion value-chain and develops inter-connectivity between them. Effective integration of all these components leads to Sustainable Fashion.



-People as designers, manufacturers, retailers, consumers, constitute the most significant component of the value-chain. They are agents of change and directly influence design development, processes and practices.

-Processes are methods and technology used to produce and transport fashion-articles.

-Products refer to finished fashion-articles.

-Proceeds are outcomes of various activities related to People, Processes and Products that affect society & environment. These proceeds, which are mostly negative and damaging at present, must be made positive to minimize harmful footprints.

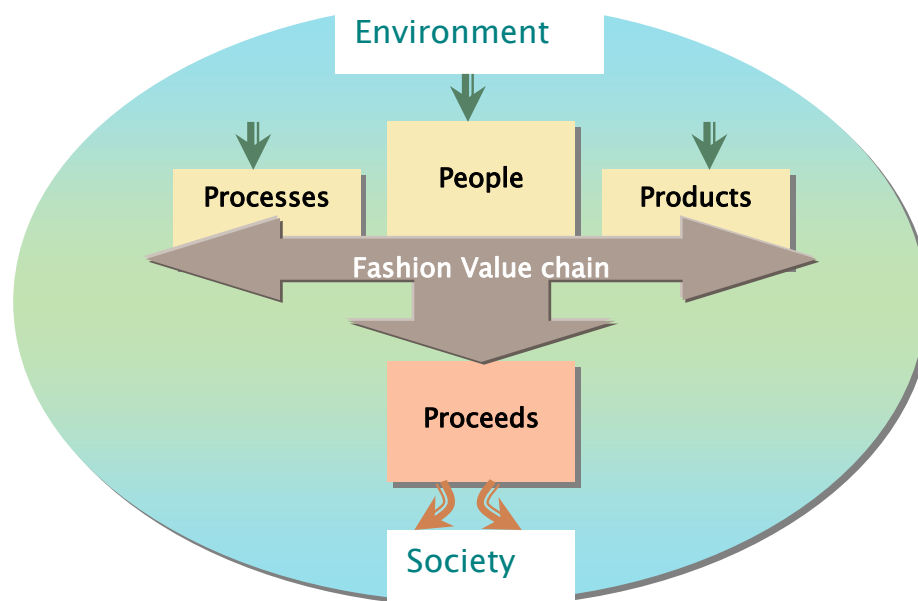


Fig.3 4-P model of Sustainable Fashion

## 8. Towards Sustainable Fashion

The journey towards sustainable fashion has begun. It is a global agenda for Change. Sustainable Fashion spans beyond fabric, finish, style, quality and cost. It can be achieved through thoughtful exploitation of resources, technology-orientation,

harmony in investment policies and institutional changes towards sustainable environment and society. Proactive involvement and shared-responsibility are required throughout the Fashion value-chain.

Concepts like Cause-marketing, environmental-stewardship and sustainable-sourcing are fast emerging. Industry as a whole is moving in a sustainable direction by using lower-impact material, introducing environment-friendly products, phasing out sweatshop labor, using fairer employment models and efficient processing techniques, empowering community projects, restorative design concepts, identifying new ways to consume, alternative visions to clothe, managing disposal and reducing the use of dangerous pollutants such as PVC.

Responsible labels are demonstrating social commitment through Corporate Social Responsibility norms. Over 20 major brands and 1200 smaller ones are selling organic fiber products. Consumers spending on 'ethical' clothing have doubled in the last two years. Companies such as Cutter and Buck, Nike, Wal-Mart and Timberland are seeking certified organic cotton. Patagonia has taken environmental-responsibility through its Common Threads Recycling Program under 'Closing the loop' strategy. By 2010, the company aims to make all its products from recycled material and be recyclable. Marks & Spencer has adopted industry-leading standards of fabric-dyeing and ethical trading initiative using Fairtrade-certified cotton. Gap is working on a social mission to generate global fund to fight deadly diseases through its (PRODUCT)<sup>RED</sup> campaign in association with Motorola, American Express, Apple, Emporio Armani and Converse. Designers like Linda Loudermilk and Katherine Hamnett are actively working towards sustainable fashion.

Sustainable Fashion is a common global goal towards a sustainable future in terms of environmental-integrity, economic-viability and a just society for present and future generations. Since there are inadequate industry-wide standards and government regulations for eco-friendly norms and in most cases this is an industry-initiative only, there is an imperative need for setting benchmarks for environmental-sanitation and green competitiveness. In recent times, there has been an increasing demand for safety regulations for limiting the use of chemicals. Some European countries use Oeko-Tex certification scheme covering consumer health & safety. Other certification schemes have been developed for the processing of organic textiles (from production to distribution) such as the Global Organic Textile Standard, EKO Sustainable Textile standards and the Soil Association Textile standards. REACH (Registration, Evaluation and Authorisation of Chemicals) is a EU law to update existing legislation on manufacture, import, marketing and end-use of chemical substances. ISO is developing standards for a labeling system to identify garments that meet environmental-friendly criteria.

Sustainable Fashion is progressive and break-through fashion. It integrates the principles of sustainable development into the functional apparatus of fashion industry and outlines relevant strategies throughout the life-cycle of a fashion product.

Strategic Imperatives for Sustainable Fashion are:

- Awareness amongst key industry players and consumers
- Connecting to nature through Environmental-friendly material, Eco-design, Green technologies, Clean & ethical practices
- Trans-seasonal, timeless designs and multi-use clothing

- Consumer involvement & empowerment for generating priority-driving demand for sustainable fashion products.
- Transport transformation
- Transparent supply-chains
- International testing and certification system
- Redesign processes and products to “close the loop” and create cyclical material flows where waste materials become raw materials for other purposes.
- Develop new Business Model, focusing on true cost of production, not just economic but also environmental and social impacts, to bring about market-based incentives for sustainable commerce.
- Make Sustainable fashion affordable & accessible.

The importance of Sustainable Fashion is unchallenged; it is no longer a choice but a necessity. Sustainability-directed mindset, environmental-stewardship, social-commitment, enhanced resource-base and technology re-orientation can make Sustainable Fashion a reality.

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