

Green Fashion: Need of the Hour for Sustainable Development (A Review)

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ABSTRACT

The textile industry is one of the world's largest industries. The production of textiles over the years has contributed to significant environmental problems, especially due to the water pollution it leads to. The emission of greenhouse gases is another important environmental aspect of textile production. In recent years, extensive research has been conducted to develop new environmentally friendly materials in textiles – that are not based on cellulose fibres from cotton, or produced synthetically from oil. This reduces the need of water, chemicals and energy required for textile production. The concept of eco-fashion, also known as sustainable clothing, is extremely important on many levels. It is typically based on three important parts of sustainability – reduce, reuse, and recycle.

1. Introduction

Indian textile sector has been enjoying rich traditional reputation in the world market for a number of decades. The growth of this industry in term of its output and export tends substantiates this. In the recent years it has been the victim of many challenges that have come up in the context of industrialisation. One of the most challenges problems for the human race today is the environmental problem. As a result, individuals, business organizations, the judiciary and the government all over the world have recognised the need of ecofriendly textiles so as to avoid or reduce environmental issues (Poonam Kumari et. al., 2013). Natural fibres are at the heart of an eco-fashion movement that seeks to create garments that are sustainable at every stage of their life cycle, from production to disposal (Benitta Christy P and Dr. Kavitha S , 2014). The modern consumer is increasingly concerned about ecological issues, with human ecology having the highest priority. Therefore, if a textile product is to be promoted as having an ecological advantage, it is the human ecology aspect, which must be addressed first. 'Sustainable development', 'environment and development', 'green banking' and 'green economics' signal a perceptible shift that has taken place over the last three decades, whereby development is more than ever before being planned to reverse natural resource destruction and conserve a healthy environment. In the era of eco-friendly environment, it has become very important for human beings to live in a world of hygiene and freshness. The necessities of human beings are not stopped with food, clothing and shelter alone, but to be extended with pure and safe air and water in a clean and livable environment (shodhganga.inflibnet.ac.in).

The most basic needs of people are provided by the textile industry hence it holds the importance of maintaining sustained growth for improving life's quality. The phenomenal growth of the textile industry brought about prosperity, but also the deterioration of environmental surroundings called pollution (Moses J. and Ammayappan L., 2006). Textile wet processing (i.e. preparation, dyeing, printing and chemical finishing) has always been considered one of the major industrial sectors in terms of water consumption and pollution. Over the last few

decades ground water and the soil fertility are the two natural resources severally affected due to the salts and chemicals from the effluents of the dyeing factories. The wastewater discharged by textile processing units ultimately reaches the land and surface water. Any adverse impact of such wastewater ultimately reflects in surface water quality since rainwater carries all such harmful elements from land to surface water. The direct discharge of wastewater on water bodies like streams and rivers pollute the water and affect the flora and fauna. Scarcity of water in India poses a major threat to human life as well as industry.

There is no fast fix to the "fast fashion" industry, but much like the choices we make when buying local foods or using public transport, we can make educated decisions when it comes to fashion too. By looking for ethically-sourced items and consciously-created clothing we can all start to protect the environment a little more. Consumer trends reflect a lot of focus on eco friendly fashion options (Hales, H. 2016). The growing concern towards preserving the environment has been much appreciated by people. Interestingly, this concern has triggered the need to opt for eco friendly labels and clothing options. The basic trick to survive in any business is to adapt to the constant changes in the consumer market (Smith, M. 2015). Adaptability is the key towards surviving and making it big in business. So if the current trend demands an introduction of eco friendly clothes as well as labels, then that needs to be provided. As a successful fashion business, you need to stay updated and adapt to the changes.

Nowadays a wide range of techniques and innovations related to textile production have been developed to save the world from being affected by the hazardous effects of chemicals. Sustainable fashion, also called eco fashion, is a part of the growing design philosophy and trend of sustainability, the goal of which is to create a system which can be supported indefinitely in terms of human impact on the environment and social responsibility (Geetha Margret Soundri, 2014). Sustainability is extremely important to survive any business. Interestingly, in the fashion industry you need to adapt to the changing fashion trends. As of now the focus has

been towards creating sustainable clothes. Sustainable clothes are basically the contribution of your business towards the cause of preserving the environment.

2. Objectives

- To impart knowledge about various eco-textiles available in commercial market
- To ascertain the need of eco-friendly textiles in present scenario
- To understand the benefits of organic textiles for sustainable development

3. Review of Literature

Indian textile industry occupies a unique position in the Indian economy. Over the period, it has gone through several changes (Chavan, R.B.2001). With increasing concerns regarding the effect the textile industry is having on the environment, more and more textile researchers, producers and manufacturers are looking to biodegradable and sustainable fibres as an effective way of reducing the impact textiles have on the environment (Blackburn, R. S. 2005). In his strategic management for a small planet, Stead (1996) stated that the world public has moved from an understanding of improvement at all costs to an understanding of continuous and balanced improvement since 1970's. In modern times, environmental protection is being implemented not because it is enforced law, but as an administrative philosophy.

Rapid degradation in environmental conditions has changed at attitude of industrial managers toward ecological environment and had them consider ecology a significant factor while taking decisions related to industrial management (Atayeter C. and Taslak S.A., 1997). Parameters responsible for environmental pollution include chemicals discharged into air, water and soil as well as energy pollution. Noise pollution caused by poorly planned settlement programs is also included in this group. Furthermore, safety and health of those working in production is also taken into account.

One of the factors that affect success is the level of environmental quality and responsibility among competing companies. Companies are now well aware of the relationship between environmental quality and prospects within the framework of economic development (Catalbas O., 2001). Consumer demands that guide companies now include certain environmental issues in addition to quality, cost and production flexibility. Demand for environmentally friendly products manufactured under natural conditions from food products to clothes has made companies more sensitive to the environment. In his publication entitled Environmental Quality and Our Responsibilities, Apak (1996) stated that companies having environmentally friendly technologies and practices had a certain advantage over their rivals on international markets. It is no longer adequate to have a finished product to be safe only to human beings, but the product has to be environmentally safe during its entire life cycle and even beyond (Deo, H.T. 2001)

4. Eco-friendly Textiles and Clothing

- Bamboo** Bamboo is an excellent source of eco-friendly fabric because it is a plant that is 100 percent naturally grown without assistance from humans. The plant itself is also completely sustainable and able to grow without any pesticides or fertilizers at all. It is fast growing and needs little care so there is great interest in using it. Bamboo fabric has a good reputation from the benefit to both human and earth in the clothing industry. Bamboo fabric has a soft touch and a stronger fabric. Due to its structure and breathability, this fabric stays cool in summers and warmer in winters. Also, it has 3-4 times more absorbent power as compared to the traditional cotton fabric; without sticking to your skin. It is very good for sportswear or casual wear. It is ready for harvesting in four years due to its fast growth. It does not require replanting because of the robust reproduction ability from its root networking. Moreover, the natural growth of bamboo does not demand any irrigation, poisonous pesticides and fertilizers. It also has natural antistatic characteristics, antibacterial properties, breathing capacity and biodegradability.
- Organic cotton** More than 25 percent of the world's pesticides are used in conventional cotton production. Organic cotton is grown without toxic, synthetic chemical inputs. This soft easy to care for fabric is the most used and most popular of all the eco fabrics. There are no limits to its use. It's being made into clothing of all kinds from underwear to jeans and is a popular choice for infant wear. Owing to non- usage of pesticides, herbicides, or insecticides during the growing cycle, organic cotton is much more environmentally-friendly than the traditional variety. It has the added benefit of not fading (in colour) and in fact, it gets more vibrant with the first few washes.
- Industrial hemp** Hemp (Cannabis plant) is rapidly renewable, requires little or no pesticides, grows without fertilizer, requires minimum attention, doesn't deplete soil nutrients and is easy to harvest. Hemp fiber is antibacterial and provides Ultra Violet (UV) protection from the sun, with a natural UV Factor of SPF 15. Hemp is an extremely fast growing crop which requires no harmful herbicides and pesticides or irrigation. The yield of hemp per acre is also remarkable. Hemp has suffered from a poor reputation but new ways of working with it has created some surprising results. It works well on its own but also when blended with other fabric yarns. It offers quite a bit of versatility, making this fabric an eco friendly fashion choice worth considering. Hemp plants grow very quickly and densely thus weeds can't take hold on it, thereby leading to non-usage of herbicides and artificial fertilisers. It requires no irrigation as it thrives on the amount of water in the average rainfall, and it is highly pest-resistant. Hemp has naturally long fibres which makes it suitable for spinning with a minimum of processing. Those fibres

are also long-lasting. Hemp fabrics come in a variety of weights and textures.

- d) **Recycled polyester** Polyester fibre is one of the most non-biodegradable polymers which create environmental problems. The legislation opens the door towards working over recycling of PET. Cast-off polyester fabric and soda bottles are used to make this fibre, resulting in a carbon footprint that is 75 percent lower than virgin polyester. Recycled polyester contains toxic antimony, but some companies are working on removing it from their fabrics. A new generation of fibre that is most suitable for diversified products range such as backpacks and blankets, T-shirts, sportswear, soft luggage and socks.
- e) **Soy cashmere / silk** This fabric is made from soy protein fiber left over after processing soybeans into food. The soy may be genetically engineered unless noted on the label. Soy is a crop that has a multitude of uses. From foodstuff to clothing textiles to automobile interior, the uses for soy are never ending. As for clothing textiles, soy is known as the "vegetable cashmere" because of its softer-than-cotton feel. However, it is much easier to care for than cashmere (it is machine washable and can air dry) and absorbs dyes quickly, therefore using less dye-stuffs. This is another soft fabric that makes a good choice for baby clothes, yoga wear and pajamas. Soy silk is made from the by-products of the tofu-making process. The liquefied proteins are extruded into fibres which are then spun, and used like any other fibre (woven, knitted, etc). The high protein content makes it receptive to natural dyes, so you can create your own colours.
- f) **Tencel** Tencel is made from natural cellulose wood pulp and is fully biodegradable. It uses wood pulp and less-toxic chemicals in a closed-loop process. This fiber is created by taking wood pulp and processing it to make fabric. Manufacturers are working on improvements in processing that are making this a good option for eco friendly clothing while giving us more flexibility to our clothing designs.
- g) **Wool** Wool is a natural, renewable, biodegradable and durable fibre. Organic wool yarn is wool that is from sheep that have not been exposed to chemicals like pesticides and are kept in humane and good farm conditions. Organic Wool comes from farms that put the sheep and the environment first. Organic wool supports better animal welfare. There's restricted use of chemicals and limited residues. Wool is renewable, fire-resistant and doesn't need chemical inputs. Organic wool is increasingly becoming available as it is produced using sustainable farming practices and without toxic sheep dips.
- h) **Eco-Fi (originally called Eco Spun)** Ecospun is a polyester fiber made from 100% recycled plastic PET bottles. It can be used to create various fabrics, including fleece fabrics. Eco-fi can be used by itself, or it can be blended with other fibers such as cotton, wool, and tencel for enhanced qualities. It can go into any textile product such as clothing, blankets, carpets, wall coverings, auto interiors, home furnishings, and craft felt. This fabric made from recycled plastic bottles is being used in clothing from fleece outerwear, sweaters, caps, totes and even t-shirts.
- i) **Alpaca** Alpaca fleece is the natural fiber harvested from an alpaca. It is light or heavy in weight, depending on how it is spun. It is a soft, durable, luxurious and silky natural fiber. While similar to sheep's wool, it is warmer, not prickly, and has no lanolin, which makes it hypoallergenic. Alpaca fiber is naturally water-repellent and difficult to ignite.
- Alpaca sheep don't require insecticides to be injected into their fleece, are fairly self-sufficient, don't need to be treated with antibiotics, and don't eat very much. It seems they've taken the idea of being eco-friendly upon themselves. Alpaca wool is also long-lasting, which may help make-up for the fact that the alpaca product you buy will likely be imported.
- j) **Jute** Jute is known as the 'Golden Fibre' due to its golden brown colour and its importance. In terms of usage, production and global consumption, jute is second only to cotton. It is the fibre used to make hessian sacks and garden twine. Jute fibre is 100% bio-degradable and recyclable and thus environmentally friendly (<http://www.wildfibres.co.uk/html/jute.html>).
- A hectare of jute plants consumes about 15 tonnes of carbon dioxide and releases 11 tonnes of oxygen. Cultivating jute in crop rotations enriches the fertility of the soil for the next crop. Jute also does not generate toxic gases when burnt. Similar to hemp, jute is a bast type of vegetable fibre used for thousands of years, with outstanding potential for the future (<http://www.fao.org/economic/futurefibres/fibres/jute/en/>).
- k) **Ramie** Ramie is one of the strongest natural fibers. It exhibits even greater strength when wet. Ramie fiber is known especially for its ability to hold shape, reduce wrinkling, and introduce a silky lustre to the fabric appearance (http://www.doshi-group.com/manufacturer_ramie_fiber_india.asp).

It is not as durable as other fibers, and so is usually used as a blend with other fibers such as cotton or wool. It is similar to linen in absorbency, density and microscopic appearance. Because of its high molecular crystallinity, ramie is stiff and brittle and will break if folded repeatedly in the same place; it lacks resiliency and is low in elasticity and elongation potential (Clark and James H. 2017).

- l) **Organic linen** Flax is a natural raw material, making linen one of the most sustainable textiles known to man. This collection of organic linen goes one step further and represents the ultimate in ecological and sustainable production. (<https://www.libeco.com/en/sustainability/organic-linen.aspx>)
- m) **Milk silk** Cyarn milk protein fiber is healthy for skin, comfortable, with bright colors due to good dyeability, etc. The milk protein fiber can be spun purely or spun with cashmere, silk, spun silk, cotton, wool, ramie and other fibers to weave fabrics with the features of milk protein fiber. It can also be used to create top-grade underwear, shirts, T shirts, loungewear, etc. to satisfy people's pursuit of comfortable, healthy, superior and fashionable garments (<http://www.fibre2fashion.com/industry-article/5279/an-introduction-to-milk-fiber-a-review>). As it is having continues graft polymerization technique hence it is totally eco-friendly in nature. It can be considered as "Green Product" as no formaldehyde is present in the product. Milk fiber is made from milk casein instead of fresh milk. We may use acid, reactive or cationic dyes for this kind of specialty fiber; pH of milk fiber is 6.8 which are same as that of human skin. Hence the products made up from them are more compatible to human skin. Milk Fiber contains seventeen amino acids and natural anti-bacterial rate is above eighty percent. Hence milk fiber has sanitarian function. It is a new synthetic Fiber having milk protein as main material based on high technical process. Milk Fiber has the advantages natural Fiber combined with synthetic Fiber. These are more comfortable, excellent water transportation and air permeability.
- n) **Corn fibre** Corn fibres have emerged as an eco-friendly substitute for synthetic fabrics and are being used for making not just clothes, but also in geo-textiles and home textiles. Corn fiber has similar characteristics to polyester staple fiber and has the luster of silk, meanwhile its moisture regain surpass polyester, so the fabric made of it is much comfortable. Although the PLA fiber is not inflammable, it has the character of low flammability and smoke generation; its flexibility and curl recovery is very good so the fabric has

good shape retention and anti-crease, it has excellent and touch and drape, good dye ability and it can be dyed with dispersion dyes under normal pressure, and it has the character of excellent anti-to fade in color and unaffected by UV light.

Corn fibre is a manmade fibre which has all the advantages of synthetic materials and various properties of natural products such as cotton and wool. The manufacturing of polymer in corn fibre involves process of fermentation, distillation and polymerisation of simple plant sugar (maize dextrose) on an industrial scale. First, the sugars are fermented. After fermentation, products are transformed into a high performance polymer called polylactide, which can be spun or processed into corn fibre. The production and use of corn fibre create less pollution and fewer greenhouse gases.

- o) **Other eco-friendly fibres** Apart from the eco-friendly fibres mentioned above, here are some other eco-friendly fibres listed below: Pineapple fibre, Banana leaf fibre, Black diamond fibre, PLA fibre, Lyocell, Lycra, Organic Wool, Organic Silk etc.

5. Problem of Pollution

Since textiles are related not only to engineering and technology, but also to the human personalities, moods, seasons, occasions and so on, the value addition can never be perfect and pleasing to all. Textile processing is a major contributor to the pollution load of the global environment. With dawn of the 21st century, the inexorable environmental legislation places a stringent demand on industries on the level of pollutants that can safely dispose of. Uncontrolled economic growth, urbanization and industrialization can rip apart land, forests, mines, overuse ground water systems, dam, rivers, pollute water and air, and stuff the land with unknown poisons and erodes the rural resource base. On an average, about one million litres of effluent is discharged per day by an average sized textile mill having a daily production of 800kg. About 60 per cent of the energy is used by dyeing and finishing operations. Environmental problems associated with the textile industry are in the form of water pollution. Natural impurities extracted from the fibre being processed along with the chemicals used for processing are the main source of pollution. Effluents are generally hot, alkaline, strong smelling and coloured by chemicals used in dyeing process. Some of the chemicals discharged are toxic and other environmental issues include air emissions, notably Volatile Organic Compounds (VOCs).

- a) Processing of natural fibers such as cotton as well as synthetic fibers such as polyester in order to make them into fabric requires huge amounts of toxic chemicals, and excessive supplies of water. During this process the toxic wastes are

dumped both into land or water, making land unsuitable for agriculture and water for drinking.

- b) Using huge supplies of water throughout all stages of clothing production contributes to water scarcity on our planet.
- c) Dying clothes in all the bright colors that we love so much requires the most water and the most toxic, carcinogenic chemicals, all of which are also released into the land, water and air in the process.
- d) The manufacturing process itself causes large emissions of CO₂ into the atmosphere, contributing to global warming.
- e) Oil is heavily utilized throughout, from processing to distribution, further polluting the environment and contributing to keeping the demand for oil high.
- f) Every year, million tons of textiles are dumped. Less than 25 per cent of this waste is recycled, which means the rest goes into our landfills.
- g) It takes agricultural energy to produce natural fibers and mining or processing for synthetic fabrics. Energy is also needed for production, processing and shipping of the fabric and finished product.

Nylon and polyester are made from petrochemicals, which are very polluting to the environment, causing global warming. They are also non-biodegradable, which means they don't break down easily and so are difficult to dispose of. In order to manufacture nylon, nitrous oxide is released as part of the process. Nitrous oxide is a greenhouse gas that is 310 times stronger than carbon dioxide and causes global warming. Non organic cotton uses more pesticide per cotton plant than almost any other crop in the world. This has serious impacts, causing illness and even death amongst cotton farmers who are exposed to dangerous pesticides every day. These pesticides also affect local eco-systems, killing certain plants and animals and causing an imbalance. Hazardous chemicals are also used on wool – for example in sheep dips, where they have been linked with illness amongst sheep farmers. Certain dyes are thought to cause cancer. In many parts of the world, garments are dyed or bleached using toxic chemicals without proper precautions; the chemicals used can then affect workers and flow into sewers and rivers, damaging local ecosystems.

6. Need for Eco-friendly Clothing

Since ages, fashion has been one of the most important factors of every civilization. People have devoted their lives to set a new trend and making others look good — or you may say “style in a better way”. It's a race that everyone wants to win. A parallel race, supported by many other groups, is for saving the environment. Some thought that life without changing fashion trends is no life at all, while ditching the planet can be translated as death to all on the longer run. The realization of the fact gave birth to the concept of eco-fashion, also known to be sustainable clothing.

The concept of eco-fashion is based on the three Rs of recycling and the three Legs of sustainability; reduce, reuse, recycle and economics, ecology, (social) equity, that is everything needed to make the planet and the society a better place to live.

Sustainability of clothes is also increased manifold. Clothing becomes more durable because of the absence of chemicals (natural colours do not fade away that easily), can be fairly reused and ultimately recycled. Imply the ethical code throughout the eco-fashion production process that is procurement of raw material, transporting it to the factories, manufacturing, distribution and finally the sale; the society moves towards economical growth and stability.

The purchasing power of the entire working class involved improves, increasing the demand of many products. With an increased demand, the production process in those sectors would flourish, generating further investment and employment for more which will in turn improve their purchasing power — and the cycle goes on. With the economic prosperity and social equity, the society can rid itself of many evils leaving the people to excel and prosper.

Fashion is something that people will never let go of. It is a huge industry; being flourished worldwide and can play a very important role for saving the planet in many different ways. Eco-fashion gives you sustainable clothing, a healthier environment and a prosperous growing economy.

7. Advantages of Eco-friendly Textiles

- Eco-friendly textiles are fashionable
- Organic fabrics feel good
- Sustainable crops are better for the Earth
- They are good for the people
- These textiles last longer
- Their production is socially responsible
- Buying organic garments make sense
- They are cost-effective
- They offer outfits to withstand more machine-washes than most non-organic clothing

8. Conclusion

It's time to get rid of our throw-away mentality and take a look at the steps we can make on a personal level to help stop this vicious fast-fashion cycle. By shopping sustainably, for quality over quantity we can wear our clothes for longer. We know that we're supporting the good stuff, and in some way helping the world. We can repair, restyle and rework garments, without giving up on them first. Shop second-hand, shop small businesses – whatever you do, look at the label; and try best to shop ethically and sustainably. Textile industry has a heavy impact on the environment as the current practices are unsustainable; and companies, environmentalist and consumers are looking at strategies for reducing the textile carbon footprint. So, there is need to produce the

textile materials which are eco-friendly through using different processes like enzyme technology, plasma

technology, super critical carbon-di-oxide dyeing or foam technology etc.

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