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Eco-friendly approach to reduce textile waste

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Abstract
We are all well aware that human activity threatens the planet's and ecosystem's stability. Natural resources, such as trees, animals, land, and the ocean, are currently being actively protected by designers and leaders in the fashion business worldwide. We should understand and adhere to organic and natural fashion. By recycling, reducing, and reusing clothing, utilising natural fabrics and dyes, employing natural accessories, and practicing organic production devoid of chemicals and pesticides, we may promote eco-fashion. One of the most polluting industries is the textile and fashion business. Pre-consumption waste from textile manufacture is not the only source but waste from textile consumption i.e. post-consumption is also the threatening factors. The textile industry has made numerous steps to lessen its detrimental impact on the environment and the planet in order to address this issue. Textile recycling, or the repurposing of fibers from textile waste, is one such strategy. 3R'S i.e., re-using reducing and recycling are the best steps to reduce textile waste and to minimize the pressure over natural resources by textile industry. Recycled fibres are also used in upholstery, food packaging materials, package textiles, automotive interiors, building construction textiles, acoustics, and geotextiles. Recycling can be done mechanically, chemically, or thermally. By reducing the need for textile chemicals, utilising less landfill space, consuming less energy, and minimising water waste, textile recycling benefits both the environment and the economy. This study paper's primary goal is to learn about sustainable strategies for lowering the generation of textile waste.

Keywords: Organic cotton, eco-friendly methods, eco-system, sustainable fashion, recycle, reduce

Introduction
Unchecked industrial expansion leads to major environmental catastrophes. The main pollutants in the atmosphere are dust, methane, carbon dioxide, carbon monoxide, nitrogen and sulphur dioxide oxides, mercury, fluorides, and metallic traces. In addition to it comes nuclear contamination. One major source of pollution is improper garbage disposal. Between 1.5 and 1.9 billion pounds of fresh fibre waste are produced annually by textile mills, fabric manufacturers, and fibre producers. Clothing industries create 450-600 million tonnes of garment cuttings per year. Among the waste products of industrial processes are scraps and yarn. The production and storage of yarns and textiles is the source of these wastes, which include cardboard reels for storing fabric, drums for storing chemicals, and cones for holding yarns for knitting and dying. Most of this waste also occurs during operation, like housekeeping, bale openings, transportation, and service. These waste materials are recyclable. Additionally, recycled fibers are utilized in acoustics, building construction textiles, geotextiles, automobile interiors, package textiles, food packaging materials, and upholstery.
Lint wastes can come from various stages of the textile production process, especially the preparatory, dyeing and washing stages. The filtration procedure makes removing lint simple. Periodically, the filters need to be cleaned. The gathered lint could be burned or dumped in a landfill. Toxic gas emission by textile waste. Methane gas is another byproduct of waste decomposition and a primary contributor to greenhouse gases that cause global warming. Along with methane, organic fibers and yarns like wool decompose to release a lot of ammonia. In both terrestrial and aquatic ecosystems, ammonia is extremely poisonous when it is in the gaseous state. Synthetics based on cellulose decompose more quickly than those based on chemicals. Large-scale textile waste incinerations in the past have released organic materials that may be hazardous to both people and the environment, including dust particles, heavy metals, dioxins, and acidic gases.
Green fashion, or eco-friendly fashion, is the way to go if we have to protect the environment

and natural resources. In order to preserve production sustainability, a responsible customer should always insist on eco-friendly goods. The apparel and textile sector is the second-largest employer globally and makes a substantial contribution to economic growth on a global scale. Fashion design is an exciting career with great income potential, and fashion is a never-ending process. A sustainable future can be achieved by employing eco-friendly practices.

We can ensure a sustainable future for our future generations by using eco-friendly practises in textile production and labour laws, among other things. Future generations would greatly benefit from a world of green fashion if the entire fashion industry becomes environmentally friendly. Consumers can put significant pressure on designers and manufacturing facilities to adhere to eco-friendly patterns in order to protect the environment and the earth by embracing eco-friendly or green fashion. Sustainable Development (SD) has become a development paradigm—the catchphrase for global aid agencies, the jargon of development planners, the theme of conferences and academic papers, as well as the slogan of development and environmental activists (Ukaga, Maser, & Reichenbach 2011) [4]. People in society understand, how important sustainable approaches are for us. Designers and artists from over the world are actively trying to save the planet's natural resources, including its land, trees, oceans, water, and wildlife, as the fashion industry has realised the importance of being green. Many companies use natural, organic, or recycled materials to make clothing, accessories, jewellery, and shoes. The market for eco-fashion is still quite young. It requires a great deal of effort and time. Eco-friendly apparel is made from natural or wild organic materials, such as cotton and jute grown without the use of pesticides and silk made by worms that eat organic leaves. These products were treated with little to no use of bleaches and hazardous chemicals to give the fabrics finishing. This approach promotes the use of worn and recycled textiles. They either don't include any synthetic chemicals or toxic substances, or they only utilise them sparingly. Having materials that get dirty less easily and that are more hygienic for a longer period of time, as well as using more efficient detergents made with less dangerous chemical substances (Fletcher 2008: 75) [1], represent important objectives from the point of view of environmental safeguarding. People suddenly realise that sustainable eco-fashion is not only elegant and stylish but also the best fashion statement someone could make in the modern world. "Sustainability isn't just about adopting eco-friendly materials; it's about reimagining the entire fashion system from design to disposal." While this quote doesn't have a specific attributed source, it reflects a common sentiment among sustainability advocates in the fashion industry. It underscores the need for systemic change rather than just surface-level adjustments to materials or processes. This idea is often discussed in academic literature, industry conferences, and sustainability-focused publications. According to some experts, an excessive focus on the role of technological innovation may shift attention away from the idea that sustainable clothing depends on the shared responsibility of all stakeholders (instead of individuals), including not only industrial managers and entrepreneurs but also retailers, policy makers, consumers, etc. (Welters 2008) [2].

Being sustainable involves evaluating and comprehending what you already own rather than just expanding your wardrobe with new ethically produced items. Making the most of already-owned items is essential to sustainable fashion. The first step in sorting out what you need, what you no longer wear, and what might use a makeover is to declutter and reorganise your closet. Upon purchasing an organic skirt, bamboo fibre shirt, or pair of organic jeans, people instantly fall in love with the clothing and become even more passionate about the concept of eco-friendly design. Today's consumers take no chances when it comes to their health. He requests organic textiles with natural dyes and finishes with pride. He is prepared to spend more on trendy, natural products. Numerous academics have acknowledged that in the past years, consumers' awareness of the intricacy of the textile supply chain has significantly expanded (New 2010) [3]. They claim that consumers are aware of the Fact that a clothing item's sustainability is dependent on a number of aspects, including fibres, yarns, dyeing methods, and transportation, in addition to typical environmental issues and workers' rights.

Reduce, reuse and recycling

Reduce, reuse and recycle is the another alternate to be eco-friendly or a step towards sustainability.

Reduce: By avoiding impulsive buying, we not only save valuable financial resources but also prove ourselves to be aware consumers confining and restraining to only actual requirement of textiles. If we talk about sustainability then the best jacket is that which already exist in our wardrobe.

Reuse: When it comes to clothing and textiles, reuse can take on a number of different forms. Repairing damaged things rather than throwing them away is the first step. Choosing second hand clothing and textiles over new ones could prevent millions of tonnes of textile waste. One of the advantages of the 3Rs (reduce, reuse, recycle) idea is using reusable items rather than disposable ones. We can make swap shops, sharing clubs to give a spurt to this moment.

Recycle: It always vary according to origin of the fabric. Cellulosic fibre can be shredded down whereas synthetic fibres along with shredding can be re-spins through chemical spinning. In case of wool and acrylic the fiber can be recovered through disintegrating and it can be reused after some finishing's. Used up textile can be up-cycled with the help of various types of ornamentation and designing. Shredding down used textile to form carpets rugs and durries is also one more alternate towards sustainability.

Some important terms

Regeneration: recreates fibre from a natural source using heat and chemicals. For example, Tencel, Lyocell, and Seacell are a few of the well-known businesses that turn wood into textile fibres. After the trees are felled, the wood is cut into little pieces, which are subsequently heated to a high temperature, treated chemically, and compressed before being spun into a textile thread.

Non-woven technology: The process of creating non-woven fabrics from very short fibres by joining them with heat, glue, chemicals, and ironing is known as non-woven technology. Non-woven recycled textile made from discarded cellulosic material works especially well for textiles.

They are used in agriculture, automobile interior, construction, geotextiles, filtration, upholstery. Nonwoven sound and thermal insulation mats can be made of recycled polyester and waste wool.

Upcycling technology: It transforms a waste product into a raw material that is more valuable than the original. In other words, upcycling is the act of turning garbage into a new product that is at least as good as the old one. Textile scraps can be recycled for felting, shredding, luxury handbags and stuffing pillows. Cotton waste and fly ash can be used with cement and water to create insulated construction material.

Downcycling technology: Helps to transform a product into another new product but with low quality or low inherent value. When scraps of old clothes are converted into mats or Rugs then this is called downcycling.
Another technique is regeneration, which recreates fibre from a natural source using heat and chemicals. For example, Tencel, Lyocell, and Seacell are a few of the well-known businesses that turn wood into textile fibres. After the trees are felled, the wood is cut into little pieces, which are subsequently heated to a high temperature, treated chemically, and compressed before being spun into a textile thread.

Non-woven fabrics: From very short fibres are created by joining them with heat, glue, chemicals, and ironing is known as non-woven technology. Non-woven recycled textile made from discarded cellulosic material works especially well for textiles.

Recycle Polyester from sea-waste: Melted recycled polyester polymer from recycled water waste light bottles nets, is used to create new fibre. It conserves raw materials, promoting a sustainable future.

Coir: Coconut fibre, sometimes known as coir, is a type of hard structural fibre. It is a significant commercial product made from the coconut's husk. Through natural retting, the fibres are made soft and pliable. Fibre from coconuts In many nations that produce coconuts, particularly India, Tanzania, Kenya, Bangladesh, Burma, Thailand, Sri Lanka, Nigeria, Ghana, and others, coir-based industries have grown. The production of coir is a long-standing industry in India that has ingrained itself deeply into the rural economies of the coastal regions.

Vegetable cashmere: Soy silk is made from leftover tofu. The liquid is extruded into fibres and then spun into yarns. Vegetable cashmere is a common name for the delicate fabric. The hulls of soybeans are used to make this plant-based fibre. These hulls are also by-products of the food business; in fact, the leftover soybean hulls are used to make soy fibres. It is inherently biodegradable and may be grown organically. Pesticides can be used sparingly or not at all when growing soy. It is among the most widely used substitutes for cashmere. Because soy cloth feels so smooth, delicate, muted, and lustrous, it's also called "soy silk." Soy fabric has a wonderful drape and is incredibly elastic. Although this cloth dyes nicely, the first few washings sometimes cause colour bleeds. Soy cloth does not shrink or wrinkle, despite being somewhat prone to pilling. The chemical makeup of soy cloth gives it additional special qualities. For example, this fabric has strong antibacterial properties and is resistant to UV rays. Soy fabric is pliable, soft and lightweight. It also has subdued lustre due to its light-reflecting properties.

Fibres from fruits extracts: The juice shops results in piles of fruit extracts which can be utilised as a base for regenerated fibre. Every year, tonnes of waste are produced by Italy's citrus fruit industry. High-quality textile may be made from that organic waste, which shows promise. The citrus cellulose material prototype was unveiled by the entrepreneurs. The material is made from pastazzo, which is the Italian word for fruit pulp and other organic waste that is left over after orange juice is prepared. The pastazzo is processed in order to remove the citrus cellulose and spin it into yarn. The fibre has properties similar to those of silk and can be combined with other materials to create an opaque look.

Conclusion

Textile fibers and filaments composed of regenerated cellulose are called rayons (Calvin Wooding, 2016). Cellulosic fibers are more degradable and instead of synthetic stuff, their production should be increased. The production house and industries should take a strong step to sustain eco-friendly approach and to reduce the scrape production. An awakened consumer should reduce, reuse and recycle their obsolete products. There should be more researches and technological inventions to ensure sustainability in production. There must be strict guidelines raised by government legislations and regulatory bodies along with strict compliance regarding hazardous chemical free production. At last it can be concluded that if we consider sustainability, the best dress is the one which already exist in our wardrobe.

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