

## Sustainability of Fabrics Through Garneting

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**Abstract :** The use of pesticides and fertilizers, in addition to water, makes the global textile industry one of the most polluting and waste-generating sectors in the world. Plenty of companies boast about apparel made from PET bottles, but when that item of apparel is no longer wanted, its disposal once again becomes a nagging issue. Tonnes of old clothes end up in landfill. Manufacturers and fashion houses need to think harder about recycling. Few municipalities accept textiles into their recycling programmes. Add the heaps of clothing rejected by retailers because of flaws or they've missed the season, and the result is a resource that is not as easily recyclable as aluminum cans, glass, or even plastic. Annual disposal of one million tonnes of discarded apparel, and either recycles or finds an alternate use for everything from towels to sari fabric. As the textile, apparel, fashion, and retail industries move to become more sustainable, an area of interest is the use of recycled fiber, yarn, fabric, and product content in the development and production of new products. The decision to use recycled materials in products must occur during design and product development and continue throughout the manufacturing processes. One hurdle for increased textile recycling is that the various fibres that comprise clothing make reprocessing and recycling a challenge. Some materials such as cotton and linen can be composted, but petroleum-based fibres such as polyester have little chance for reuse. There are several recognized stages in recycling collection, processing, and then use in a new product. Recycled materials used in textile and apparel products can be obtained throughout the textile and apparel supply chain and post-consumer collection methods.

**Key words :** recycling , garneting , discarded apparel , reprocessing , post consumer collection

### Textiles Can Be Recycled

“The key differentiation is between ‘mechanical fibre recycling’, which will degrade with each recycling (down-cycling) and ‘chemical fibre recycling’ which in some cases can produce fibres of equal quality to virgin ones”.

Mechanical recycling of natural fibres like cotton and wool is currently the most scalable recycling technology for post-consumer textiles but the result is shorter textile fibres of a lower quality to virgin fibres, To increase quality, recycled fibres must be blended with virgin fibres. When it comes to chemical recycling, only polyester and certain nylons can currently be reprocessed. However, new technologies are being developed and cotton could be up next.

### OBJECTIVES

- To examine and understand the The diversion of old textiles for reuse meets the requirements of clothing.

- To make sense of the relationship between future textile recycling as important industrial activity .

- To explore the Methods to collect the clothes for recycling .

- To know the workers and sustainable production techniques used in the process of recycling of fibers .

### HYPOTHESES

- The present study intends to prove following hypothesis.

- It is assumed that The diversion of old textiles for reuse meets the requirements of clothing has a negative significant correlation.

- Sustainable production techniques are positively related and also contributes significant positive correlation between workers and sustainable production techniques.

- There is a significant positive correlation between future textile recycling as important industrial activity .

**METHODOLOGY: Collection of Cloth**

The clothing banks are empty regularly by team of local collector which are later transported to the ware house for sorting . Method is use to collect the clothes for recycling .

**Door-to –Door, Collection**

This is the method of personal contact, bags are distributed to resident every week and collected back from them on a specific date. These bags are collected with vehicles having logo for recognition. More clothing are collected from door-to-door as compare to clothing bank. Textile, linen and rags can be recycled. After sorting out the good ones, the others are sent to shredding to make mattress filling, insulation and soundproofing for cars. The textile waste material industry is more like mining company. Textile waste material industries include shoddy producer, laundry and wiping rag producer, clothing sorted, shredders and garnet in this process the fibres are recovered from hard twisted waste, rags and chippings. The materials and return it a fluffy fibrous condition so it can be reused in blends.



**Clothing banks**

The clothing banks are empty regularly by team of local collector which are later transported to the ware house for sorting.



**Process of Recycling Garments (Garneting)**

Clothing fabric generally consists of composites of cotton (biodegradable material) and synthetic plastics. The textile’s composition will affect its durability and method of recycling. Fiber reclamation mills grade incoming material into type and color. The color sorting means no re-dyeing has to take place, saving energy and pollutants. The textiles are shredded into “shoddy” fibers and blended with other selected fibers, depending on the intended end use of the recycled yarn. The blended mixture is carded to clean and mix the fibers and spun ready for weaving or knitting. The chips are melted and spun into new filament fiber used to make new polyester fabrics. Some companies are creating new pieces of clothing from scraps of old clothes .

The fibers can also be compressed for mattress production. Textiles sent to the flocking industry are shredded to make filling material for car insulation, roofing felts, loudspeaker cones, panel linings and furniture padding.

For specialized polyester-based materials the recycling process is significantly different. The first step is to remove the buttons and zippers; then the garments are cut into small pieces. The shredded fabric is then granulated and formed into small pellets. The pellets are broken down polymerized and turned into polyester chips. The chips are melted and spun into new filament fiber used to make new polyester fabrics. Some companies are creating new pieces of clothing from scraps of old clothes. By combining and making new additions, the eclectic garments are marketed as a type of style

The process of garneting is the use of machine, listed below are the process:

1. Used sweater to be sorted
2. Cutting out the labels
3. Bags of labels been made into shoddy
4. Bale of sweater arrange
5. Loading to chopper
6. First stage of chopping/ garneting
7. Each stage of garneting uses finer-toothed mesh

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8. Fibrous stage
9. Removing the button
10. Web of fibre
11. Spinning the yarn
12. Preparing yarn for weaving
13. Bolts of yarn
14. Weaving
15. Finishing the blankets
16. Finished blankets

**Fiber Recycling :**

Textile fiber waste can be classified as either pre-consumer or post-consumer textile waste. Pre-consumer textile waste is the leftovers or by-products from textile-, fiber- or cotton industries. Post-consumer textile waste is the waste of fleece, flannel, corduroy, cotton, nylon, denim, wool, and linen, which have already passed through the consumer market and are recycled and re-constituted into a product for the consumer market once again. Textiles in landfill biodegrade to form methane gas which is released into the air and is not suitable for human consumption, which is one of the most effects, that recycling is addressing by diverting textile from landfill . The recycling of textile waste can serve as a means of providing solutions to many economic, environmental and social issues. Though textile recycling has old history; in recent years it has assumed prime importance due to Fast Fashion culture in western world which has resulted in over consumption of textiles and corresponding waste generation. Today waste recycling has become a multibillion industry. Innovations are being made in terms of development of sorting machines, design inputs, innovative high value products to make recycling a profitable proposition

Today, recovering textile waste is a multi-billion dollar global industry that performs a vital social and environmental function and provides employment for millions of people all around the world. An internet search on “textile waste” will elicit thousands of products or listings, including headings such as hosiery cuttings and clips, polyester tow, cotton

shoddy, used clothing wiping rags, denim/jean clippings, 100% cotton yarn waste, silk fiber waste, etc.All textile waste streams are often unrealized sources of valuable raw materials that can be repurposed or regenerated into saleable and usable products by intelligent collection, sorting, re-engineering and reprocessing. In essence, the liability of “waste” is turned into an asset often based on intellectual property (IP) which has been specifically developed. Processing machinery is also likely to be engineered to produce a specific product and thus the investment in developing regenerating capabilities is often large-scale. Products made by regenerating textile waste include acoustic textiles used for sound proof blocks, insulation, roofing felt, bank stabilization, and as pollution control filters. The list can be left to the imagination. Some of the international efforts to divert textile waste into valuable products are only briefly mentioned. Listing is indicative of the seriousness in the business of textile recycling for environmental sustainability.

**Collected Clothes - Cutter, Chopper, Crusher**



Waste textiles converted into fibers



Recycled fibers from waste textiles



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## Different Methods of Recycling of Fibers

Clothes are a necessity, and one of the biggest challenges facing today's fashion industry is how to create fashion for a growing world population while protecting our planet.

### 1. Polyester-Eating Microbes

Polyester—now the most common material used to make clothes, and made from petroleum as a raw material—is hard to recycle without losing quality. But a new type of microbe can eat an old shirt and break the polymer down into a basic raw material that can be sold back to polyester manufacturers. The process even works on fabrics that are a mix of materials, like cotton and polyester. The result is cheaper than making new fabric from petroleum.

### 2. Recycling Food Waste Into Yarn

Orange juice manufacturing results in piles of wasted peels and seeds—maybe as much as 25 million tons of waste a year. One startup has developed a process that turns citrus byproducts into raw material that can be spun into yarn. With a working prototype, the team is ready to start testing the process in other orange-growing regions around the world.

### 3. Algae-Based Fabric

Growing a traditional fabric like cotton usually has an enormous footprint: It can take more than 20,000 liters of water to grow enough cotton for a single pair of jeans, and cotton also uses more insecticides than any other crop in the world. Quick-growing algae, on the other hand, doesn't require extra water besides the oceans and lakes it grows in, leaving land free for growing food instead. This startup is working on an open-source process for turning algae into fabric.

### Turning Cotton into New Clothes

Cotton is hard to recycle; in the past, if you gave your hole-filled jeans away for recycling, they might have been most likely to be shredded up for insulation. But this new process uses an environmentally friendly solvent to dissolve old cotton clothing into a cotton-like material that can be spun into new fibers—eliminating both waste and the problems that come with growing new cotton.

## Few Products From Recycled Fibers



### A Database to Track Wasted Fabric on Factory Floors

As much as 15% of fabric ends up trashed in the process of making clothes. This startup is designing a database that tracks the leftover material, so other designers can make use of it. “We can see that there are a vast number of great ideas out there, but we also know that access to capital, know-how and business support is scarce, “Many great ideas never get to see the light of day. With the challenge we want to find these ideas and give them the support needed to make a difference. ... The aim of the Global Change Award is to move the needle not just with one player but with the entire fashion industry.”

Waste—and the unsustainability of the supply chain—is a problem endemic to the entire apparel industry, but especially interesting in the context of fast fashion. If clothing was fully recyclable, and made with the fewest resources possible, could we keep churning out new clothing at the frenetic pace of a fast fashion company like Zara, which makes more than 1 million garments every day, in a way that was actually sustainable?

### By-Products of Recycled Textiles

For mechanical processes these by-products are mostly the hardware, such as zips and buttons. In chemical recycling, by-products can vary from chemicals and dyes to containment fibres or metallics. Chemical recyclers are working hard to optimize their processes by either recapturing these by-products and putting them to good use, or exploring ways to safely dispose of them.

### Textile Recycling Innovation Challenges

Tonnes of old clothes end up in landfill. Manufacturers and fashion houses need to think harder about recycling. With reprocessing many textile fibres a challenge, dumping old clothes is often taken as the easy option.

Cheap fashion, however, has a cost. The use of pesticides and fertilizers, in addition to water, makes the global textile industry one of the most polluting and waste-generating sectors in the world. Plenty of companies boast about apparel made from PET bottles, but when that item of apparel is no longer wanted, its disposal once again becomes a nagging issue.



One hurdle for increased textile recycling is that the various fibres that comprise clothing make reprocessing and recycling a challenge. Some materials such as cotton and linen can be composted, but petroleum-based fibres such as polyester have little chance for reuse.

3.) “Recyclon” is a recycled nylon from Unifi’s Repreve that uses pre-consumer and post-industrial nylon waste. While the makeup of the blend is not 100% recycled, the innovation has been widely celebrated by those who have been wanting a recycled nylon option since recycled polyester became available years ago.

Few municipalities accept textiles into their recycling programmes. Add the heaps of clothing rejected by retailers because of flaws or they’ve missed the season, and the result is a resource that is not as easily recyclable as aluminum cans, glass, or even plastic. Most unwanted clothing ends up in a dumpster .



The future of textile recycling lies in the supply chain, not retail stores. Annual disposal of one million tonnes of discarded apparel, and either recycles or finds an alternate use for everything from towels to sari fabric.

4.) S.Cafe is a new fiber coming out of Taiwan that uses recycled coffee grinds. Big names like North Face, Puma and Timberland are already using it, while coffee sellers like Starbucks and 7-11 are said to be some of the suppliers. Apparently coffee grinds have natural odor-masking properties without making the entire garment smell like your morning brew. It’s said that coffee grinds require less energy in the fiber-making process, making it an “earth-friendly” alternative to traditional fabrics

**Newest Wave of Innovation Coming out of The Textile Industry with a Focus on Sustainability:**

1.) **Crailar** is a flax fiber that drastically reduces chemical and water usage. It was named a 100% biopreferred product by the USDA in April 2012. In fabric form, it looks and feels almost identical to cotton.



2.) **Qumilch** is a 100% natural and renewable fiber derived from a protein in sour milk. The result is a fabric similar to silk, but less expensive, while being durable enough to withstand wash and care. Qmilch is naturally antibacterial and can regulate temperature, making it ideal for sports and activewear

5.) **Ecocircle Plant Fiber** is a plant-based PET (polyester). The new fiber contains 30% sugarcane, which replaces 30% of the oil needed for traditional polyester. Teijin, the company behind the fiber, said it will have a closed-loop recycling system at the end of the fabric’s life. Nissan is one of the first companies to use the fabric for the car upholstery in the 2014 Nissan Leaf electric car.

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6.) Evrnu is an innovative new technology that recycles cotton garment waste to create a premium, renewable fiber. More than 12 million tons of garment waste is disposed of every year in the U.S. alone. Evrnu emerged from a new way of thinking about the apparel and textile industry, by textile specialists who love fashion. The Evrnu team is currently running an Indiegogo campaign to bring the technology to a larger scale.



### Conclusion

Issues due to textile waste generation are related to over consumption of textiles in western world. The diversion of old textiles for reuse meets the requirements of clothing for 70% of the population in their developing countries. Like other wastes, textile waste disposal through landfill and incineration is responsible for global warming. Though textile recycling has old history, today it has become a multibillion industry producing innovative high value products. Many agencies and stakeholders are making efforts to contribute towards the aim of saving resources of raw materials, energy, water, etc. And reducing the impact on the environment for sustainable development. In the future, textile recycling would be as important an industrial activity as textile manufacturing.

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