

POST CONSUMER COTTON INTO A GARMENT**DHANAPRIYA G ¹**
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ASHWINI S ³¹Assistant Professor, Dept. of Fashion Technology, Bannari Amman Institute of Technology, Sathyamangalam^{2,3}Fashion technology, Bannari Amman Institute of Technology, Sathyamangalam.**ABSTARCT:**

Because more people are wearing denim clothing, there is an increasing amount of post-consumer cotton waste produced each year globally. An important hazard to environmental contamination is textile waste. Industry/pre-consumer waste and post-consumer waste both make up the textile waste. Industrial trash is produced throughout the manufacturing process as well as from post-consumer waste, which is thrown textiles after they have served their purpose. It decomposes when left to decay in landfills, releasing hazardous leachates and greenhouse gases like methane. To prevent the landfills from being overfilled with post-consumer cotton waste, which also pollutes the land. There is enough waste available that can be recycled and already is. Due to the customer segmentation, compared to the United States and Europe denim is not being widely used in India. One of the most effective way for change is customer demand, but this cannot occur without first educating the consumer and then offering viable alternatives. Additionally, items must be reasonably priced and functional. But the upcoming generation, we are so much into sustainability in the near future India will also fall into this line. And the demand for recycled denim garments will definitely be there. And this project is all about how we have constructed a sustainable denim garment with recycled cotton fabric waste according to the GRS (Global Recycled Standard).

Keywords

Recycled, Sustainable, Pollution, GRS, Cotton, Denim, Product, Fabric.

INTRODUCTION

Within the garment and apparel industry, the market share increase for denim will be significant. The primary drivers of this rise in denim demand are the global end-user population's rising levels of fashion consciousness, personal grooming, and high standard of living. The market is expected to rise as a result of recent developments, the low cost and wide availability of denim materials, as well as the rising demand for stretchy denim due to its durability and high elastic recovery. Since the demand and usage of denim is high not only denim waste post-consumer textile waste is being increased rapidly due to the fast fashion brands.

1.1. Textile waste:

Although the textile industry in India may not be among the most polluting, it has a significant negative impact on landfills and water pollution. This is also a major factor in the textile industry's aggressive target-setting for greenhouse gas reduction. Using post-consumer cotton waste will help in reducing the load on fresh raw material requirement and helps save resources.

Textile mills can maximize the use of post-consumer waste in place of virgin cotton, which will have a beneficial effect, as the textile sector looks to embrace creative ways to the production processes to reduce carbon emission. Wastes can be upcycled or downcycled into items that serve the same purpose as when they were first used. While valuable items are downcycled into lower-value materials, wastes are upcycled into high-value products with uses other than their original ones.

1.2. Recycled cotton:

One kilogram of cotton, which is equal to one T-shirt and one pair of pants, requires about 20,000 gallons of water to manufacture. Utilizing regenerated cotton is one way to avoid problems with water constraint. Even more so than organic cotton, it is an extremely eco-friendly fabric. It has a lot of benefits for making sustainable clothing.

This fiber is made of cellulose and is used to produce garments, shoes, and accessories around the world. Natural fibers like recycled cotton have characteristics that are comparable to those of regular cotton. This material dries quickly, is lightweight, and is breathable. The same uses for ordinary cotton and recycled cotton are both available

in the apparel industry.

LITRATURE REVIEW

2.1) Sustainable Innovations in Recycled Textiles - Subramanian Senthilkannan Muthu

To explore the advantages of textile and fashion recycling from an economic and environmental standpoint. When it comes to sustainable advancements in the textile and apparel industries, recycling plays an unavoidable role. Basic knowledge about the advantages and difficulties of textile recycling is sufficiently covered in the literature, and sustainable goods created from recycled textile fibres have properties comparable to those of ordinary cotton.

2.2) Sustainability in Denim - Subramanian Senthilkannan Muthu

To discover the most recent findings regarding sustainable methods and materials. Denim has numerous negative effects on the environment, including water consumption and contamination, the destruction of significant habitats, and transportation pollution, from cotton growing to manufacturing and end-of-life disposal.

Additionally, restrictions on high-end denim recycling have been brought about by recent advancements in denim manufacturing, such as the usage of materials like elastane and polyester. Dealing with the environmental, social, and economic facets of sustainability that, when combined, present a novel strategy, in order to deal with the sustainability aspects of denim.

2.3) Global Recycled Standard (GRS) – Textile Exchange

The GRS has the primary objectives:

- Definitions across several applications are aligned.
- Track and trace recycled materials used in input.
- Give customers (both consumers and brands) a tool to help them make educated decisions.
- Minimize production's damaging effects on both people and the environment.
- Assure that the resources used to create the finished product are recycled and processed sustainably.
- Encourage innovation to address difficulties with recycled material quality.

2.4) Sustainable Textiles: Life Cycle and Environmental Impact - Richard Blackburn

Environmental concerns are becoming more crucial to the textile business from the perspectives of both customer expectations and governmental regulation. The field of sustainable textiles examines methods for developing more environmentally friendly products and innovations in recycling.

The book's first section covers how to increase sustainability at several locations along the supply chain. The chapters go over how sustainability can be incorporated into textile design, how to make sure that both natural and synthetic fibres are produced sustainably, how to make processes like dyeing more sustainable, and how to use more environmentally friendly technologies like enzyme and plasma technologies. The book's second section examines how consumers regard recycled textiles, eco-labelling, organic textiles, and the usage of recycled materials in textile products.

Sustainable textiles is a valuable resource for the textile business and individuals exploring this essential subject, with a renowned editor and an excellent spectrum of worldwide contributors. Analyzes the impact of environmental legislation and consumer expectations on the textile industry discusses recycling textiles as well as ideas to develop more sustainable materials and technology. Analyzes the integration of sustainability into textile design, production, and processes.

3 MATERIAL

Materials used:

- Recycled Cotton –Open End yarn
- Recycled Denim Fabric
- Measuring Tape
- Scissor
- Marking Chalk
- Recycled Sewing Thread
- Bobbin and Bobbin case
- Buttons

The following budget analysis is done for sample development:

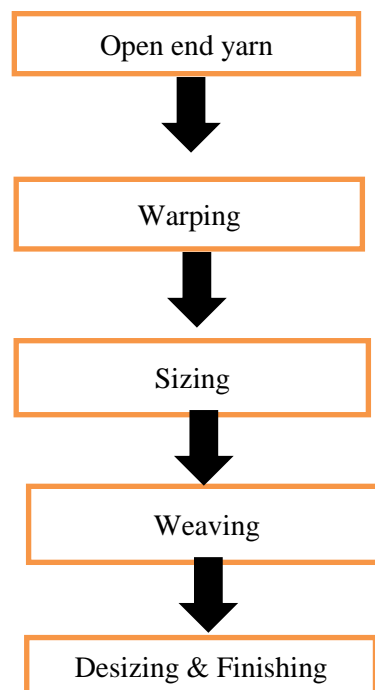
S.No.	Material and process	Quantity	Cost
1	Recycled yarn 12's count	5 kgs	Rs.1,875/-
2	Warping, Sizing & Weaving	5 mtrs	Rs.250/-
3	Finishing, Singing & Sanforizing	5 mtrs	Rs.250/-
4	Washing	2.5 kgs	Rs.500/-

The above given data for the material and process has been carried out for 5 kgs of yarn and the obtained value more or less equals to the standard value of a normal denim, so in non of the ways recycled denim is less than normal denim fabric.

The following budget analysis is done for bulk production :

S.No.	Material and process	Cost
1	Recycled yarn 12's count	Rs.375 / kg
2	Warping, Sizing & Weaving	Rs.30 / mtr
3	Finishing, Singing & Sanforizing	Rs.12 / mtr
4	Washing	Rs.50 / mtr

4 Methodology:



A. Open End Yarn :

The recycled open end yarn has been collected from the industry with a construction of 12's count with 12's warp and 12's weft coarser count. There will be no high twist yarn in open end yarn. In Open-end spinning system yarn is produced from cotton's short fibers. This yarn, which is created by analyzing even the shortest cotton threads, is extremely affordable. Higher twist counts are required to ensure integrity. Its structure becomes harder as a result. Open end dyed yarn (INDIGO) has been procured from the industry.



Fig.4.A Open End Yarn

B. Warping :

Warping is the process of preparing yarn for fabric weaving. It involves moving several yarns from a creel of individual packages to a beam. The yarns will wind onto the beam in the form of a parallel yarn sheet. The fundamental goal of warping is to create a package where the yarn ends are kept in a parallel and continuous form and to speed up the subsequent procedure, such as sizing. Here warping has been done in 63" with 4500 threads.

C. Sizing :

The technique of sizing involves covering the warp yarn with a protective material to reduce yarn breakage during weaving. The most crucial process in getting warp yarn ready for weaving, especially with cotton yarn, is sizing. This process is usually being carried out in two machines namely Bengier sizing machine which is an UK made and Jupiter sizing machine which is an Indian made.



Fig.4.C Bengier sizing machine

D. Weaving:

Combining warp and weft elements to create a woven structure is known as weaving. Warp, or length wise yarns, are referred to in weaving as opposed to weft, or crosswise yarns. The majority of woven fabrics have selvages, or exterior edges that have been treated to prevent ravelling. Parallel to the threads of the warp, they run lengthwise. Satin, twill, and plain weaves are the three fundamental types. Air jet loom has been used to weave the required. The woven fabric has been produced with 63" width.



Fig.4.D Weaving process

E. Desizing :

After a cloth has been woven, desizing is the process of removing the size material from the warp strands. Is carried out with Kuster's desizing machine.

F. Finishing:

By burning off protruding fibres, yarn ends, and fuzz, singeing the materials creates an equal surface.

G. Sanforizing :

Sanforizing, commonly known as the Sanfor treatment, is a textile finishing process applied to the item to improve the fabric's dimensional stability when washed or to stop the fabric from shrinking. It is done using a specialized machine that incorporates the fabric in a WARP or CHAIN using a mechanical and technical action. After undergoing the sanforizing process, the fabric is considered to be sanforized. The procedure entails a number of steps, including washing, pressing, drying, and chemical treatment.



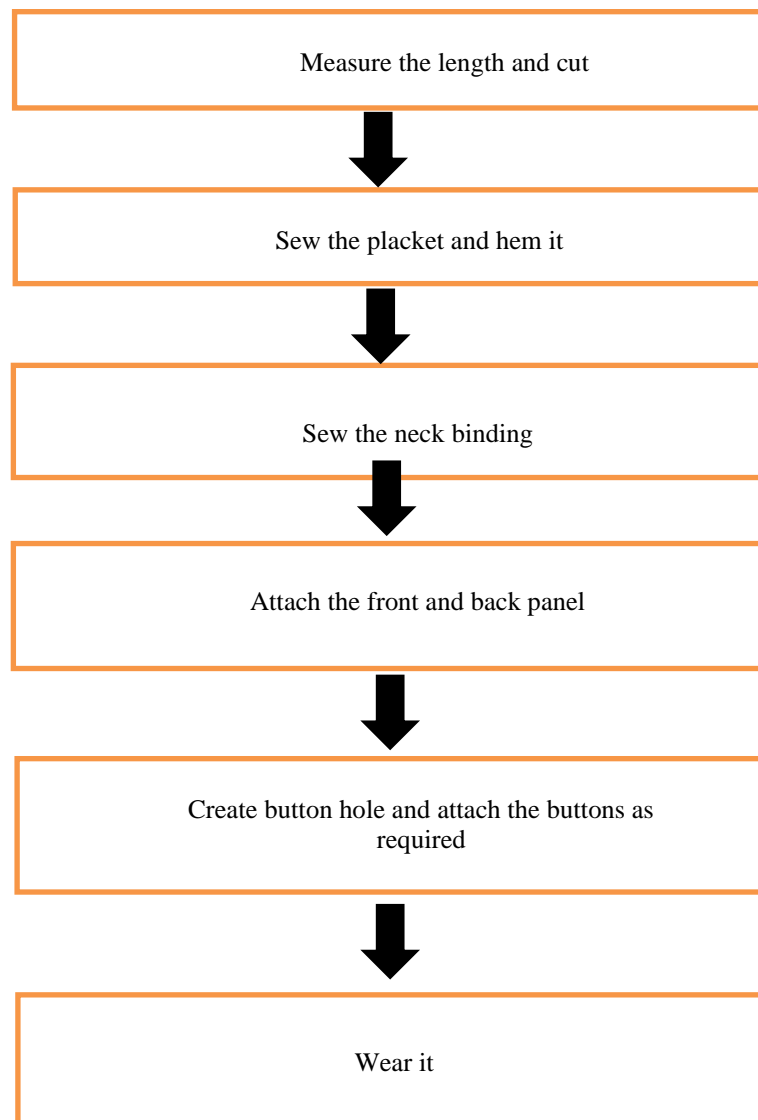
Fig.4.G Sanforising process

H. Manufacturing:

Once when the final fabric is procured the manufacturing process is to be done. Which consists of pattern making, cutting, stitching and finishing of the final garment.

We are constructing the sample garment for S size and the following are the measurements.

S.NO.	MEASUREMENTS	INCHES
1	Upper bust	31 ½
2	Bust	31 ½
3	Lower bust	26 ½
4	Waist	27 ½
5	Abdomen	33
6	Hip	38 ½
7	Thigh	32
8	Full length	35
9	Shoulder to waist	13
10	Shoulder to hip	22

I. Construction of pinafore dress :

5. FINAL OUTPUT



Fig.5. Final Garment



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RESULT AND DISCUSSION

S.NO.	PROPERTIES	OBTAINED VALUE
	Wet rub	1
2	Dry rub	2
3	Wash fastness	4
4	Tearing strength	4300
5	Tensile strength	65 newtons
6	Ozone fading fastness	1-2

Obtained loss percentage:

S.NO.	PROCESS	LOSS PERCENTAGE
1	Yarn sizing and warping	3
2	Weaving	3
3	Finishing	1
4	Fabric to garment	15
5	Washing	8

Several factors make recycled clothing adorable. It is primarily created from scrap, or post-industrial or consumer fabric waste. Additionally, compared to the energy required to turn raw materials into finished goods, recycling obsolete materials uses less energy. As for now none of the brands are selling recycled denim in India. Yes there are brands like H&M manufacturing garments and denim with post-consumer cotton fabric waste but all those are being exported to the United States and Europe. And this is because of the customer segmentation, compared to the United States and Europe denim is not being widely used in India. But the upcoming generation, we are so much into sustainability in the near future India will also fall into this line. And the demand for recycled denim garments will definitely be there. Due to the complicated process and since very few industries are manufacturing recycled denim garments we directly procured recycled cotton yarn which was made from post-consumer cotton waste from the industry and none of the industry will do this process from garnetting to fabric for sample quantity and that is the reason we procured it as recycled yarn. Therefore we've constructed a pinafore dress with recycled denim fabric according to the Global Recycled Standard (GRS).

CONCLUSION

Recycling clothing reduces pollution and environmental damage. Recycling clothes minimizes landfill space. Recycling frees up space in your home or apartment and donates the used fabric. Recycled denim fabric is a value added product and the recycled cotton yarn was used to make the recycled denim fabric which was used to make the desired clothing.

The important key factors in recycling are : Put an end to pollution and waste production throughout the design phase, keep products and materials in use & rejuvenate and renew natural systems.

In conclusion, recycling denim is essential for minimizing the impact of jeans on water and land use. Recycled cotton mixed with organic cotton also reduces other impact categories including eutrophication, potential for global warming, and abiotic depletion. Recycled textiles can be made into a variety of items, including new fabrics, cleaning cloths, upholstery, and insulation. Future research may examine the effects of various denim fabric production fibers in combination with recycled cotton. Raising consumer knowledge of their role in sustainability and environmental protection has prepared the way for an increase in recycling, not just of denim but also of many other materials utilized today. To achieve a zero waste economy, the emphasis should shift to the production of products with zero waste, and if trash does exist, it should be recycled. And it is most important for a factory or mill to be responsible, in order to prevent local rivers from becoming contaminated and from overusing the region's limited water supply, a responsible denim mill would have an effluent water treatment system that separates the colors and chemicals from the water. The created item adheres to the Global Recycled Standard (GRS).

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