

An Investigational Approach To Rehabilitating Environmentally Responsible Trends In A Given Context.

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Abstract: Sri Lanka's primary industry is the garment manufacturing industry. The garbage is introduced to the environment in significant amounts every year due to the high production capacity. Post-consumer fabric waste accounts for most discarded textile waste. Recovery prospects for controlling post-consumer textile waste have been reviewed timely. Alternative value-added techniques, such as printing and dyeing, are quickly displacing traditional value-added procedures. Instead of using destructive procedures, fabric waste from garment manufacturing can also be used as a value addition to new products with handcrafted sustainability modifications. Waste fabric pieces have been utilized as value additions above the resulting combination, strengthening the base fabric's durability, texture, comfort, confidence, and alternative styling. The purpose of this research is to produce an experimental prototype while exploring creativity-driven available options for repurposing post-consumer textile waste and proposing an entrepreneurial business opportunity to reach the local community's customer base. Meanwhile, the research will consider both environmental and ethical sustainability approaches. Experimental practical options have been tested throughout while evaluating the appropriate methodologies to find a better prospect.

Keywords: artisan applications, manipulations, post-consumer textile waste, sustainability.

I. INTRODUCTION

The apparel industry's waste has played an extraordinary role in global environmental pollution. To clear storage spaces for new stock of materials and control the enormous stoke of remaining fabric waste, the apparel industry used processes such as landfill and burning. On the other hand, the wasted portions are released into the environment as textile waste. Small enterprises remove fabric waste, which is directly released into the environment. Fabrics of various sizes and shapes are included in several fabric types, such as linen, cotton, and polyester. Fabrics of various weights and fabrics of diverse colors and patterns are also included in the fabric waste consignment. It is also a timely problem that the quantity of fabric produced is not used entirely for garment products. As a result, the need to re-manufacture fabrics also directly impacts sustainability. Mainly Garment waste is created during the pre-consumer or post-consumer stages of the manufacturing process cycle in the garment industry. In summary, pre-consumer fabric waste consists of excess fibers, yarns, fabrics and clothing during the production period, and consumers create post-consumer fabric waste that can be any type of fabric-based product (Elahe Saeidi, 2017). These creativity-enhanced experimental models can be experimented with as a new trend to make them beneficial for a new product approach or value additions. Some of the techniques that have been examined as value improvements include layering, cutting, chopping, hand grinding, and appliqué insertion. Hem finishes can be incorporated as a statement piece. The waste fabric pieces were used as a surface application to embellish once again, focusing on wasted color threads and yarns to produce the patterns. The process might be motivated by environmental and ethical sustainability and encourage, empower local artists to pursue new entrepreneurial enterprises. Such designers in the fashion industry have directed their attention towards new

ventures such as entrepreneurial companies to restructure this post textile waste with their creative involvement.

II. REVIEW OF LITERATURE

Customers buying behaviors increased with the fast-fashion concepts; a significant by-product of this, excess pre-production waste, began to be added to the environment. Due to the ever-changing fashion and the temptation of consumers to buy clothes more and more, there is an increase in post-production waste to the environment. Up to 80% of the environmental impact of products is determined at the design phase. The global consumption of materials is expected to double in the next forty years, while the amount of waste generated every year is projected to increase by 70% by 2050 (News European Parliament, 2021) This study will look into the possibility of addressing new business opportunities while also giving waste fabric pieces a new lease of life. This strategy will be successful. The fashion industry has been spotlighted as a significant contributor to global environmental issues. (Jacometti, 2019) In locally Sri Lanka in 2014 alone, 294,000 tons of textiles were imported, and a minimum of 44,100 tons of textile waste was generated. Textile waste generation is predicted to be increased with the rising quantities of production. Currently, there are no recycling facilities available in Sri Lanka and adequate waste management programs are yet to be developed (D.G.K. Dissanayake, 2018). According to the Journal of The Textile Institute in 2020, the current status of post-industrial textile waste in Sri Lanka can be stated as follows. Rejected fabrics: This waste type includes fabrics rejected due to quality issues such as color shading, or material defects that occurred during the construction process. This quantity accounts for 1–2% of total fabric waste generated in the firm.

1) - Cutting waste: This is the waste generated during the cutting process and accounts for 90–95% of total fabric

waste generated. These are usually tiny pieces that are cut off during the fabric cutting process.

2) - Production waste: Production waste consists of rejected cut panels or finished garments due to quality issues identified during the garment construction process. This is usually less than 5% of the total fabric waste generated.

3) - Excess fabrics: These are the excess fabrics that remain after completing the order. The amount varies, and factories tend to keep those excess quantities for future use, for around six months after a particular order has been completed, yet, discard them afterwards if unused (D. G. K. Dissanayake, 2020)

The textile sector has been heavily criticized for reducing the waste of natural resources, production costs, and global warming, paying attention to the consequences of overpopulation, containing the toxicity of certain industrial products, and reducing air and water pollution. (Gazzola, 2020 March 16) This business line develops outerwear catalogues for different consumer segments by following Reusing and RE-making sustainable concepts while incorporating and reducing fabric waste. It also incorporates producing high-quality, stylish, modern, and innovative design features under different sustainability principles. As a result of this, governments, consumers, and companies have given their attention to the issues of environmental sustainability and human health arising from residues of substances on products and production processes of the textile sector. Moreover, Lack of knowledgeable people, lack of technology, lack of equipment, lack of materials for recycling and lack of consumer awareness also hamper waste management. The data below are from 1960 to 2018, relating to the total number of tons of textiles generated, recycled, composted, combusted with energy recovery and landfilled (United States environment protection agency, 2017). When a product is closely tied to a global environmental concern, businesses assert their ability to create with society in mind as an excellent commercial debate and give repairs to reinforce the items to improve the quality and superiority of craftsmanship (Moorhouse & Moorhouse, 2017). The first experiment we are attempting to perform using practical-oriented approaches is fabric manipulation techniques, enhancing diverse sewing and machinery skills while collaborating with pre-consumer fabric waste. The fashion sector is under a lot of cost pressure and has high competitiveness, so it is essential to take responsibility for the environmental implications, including water, energy, chemical consumption, CO2 emissions, and waste generation. Ethical fashion has necessitated collaboration between designers, manufacturers, and consumers to discuss the impact of production processes and consumption patterns, and ethical designers must minimize environmental and social impacts while meeting consumers' needs in terms of style, comfort, quality, value, and aesthetics (Mukherjee, 2015). Brands place a higher priority on consumer awareness of the products they intend to purchase. Consumers have shifted toward sustainability as a result of the international sustainable trend. Industry decision-makers have promoted their products and brands to emphasize those features more effectively. Combining them with features like artisan, custom, fair trade, locally made, organic, and

vegan is a good idea since consumers have been concerned about recycling and vintage features of products, combining them with features like artisan, custom, fair trade, locally made, organic, and vegan (Shen et al., 2013). Slow fashion consumption is linked with the consumer ideal of protecting the natural world because both appreciations for current fashion and commitment to the environment provide significant symbolic value to innovative consumption methods. Furthermore, slow fashion consumption is aligned with the consumer ideal of protecting the natural world because both appreciations for the moment fashion and commitment to the environment add high symbolic value to new approaches to consumption (Joy & Pea, 2017). Consumers have been motivated to reconsider their consumption and need for fashion due to information regarding the negative aspects of fashion consumption. As a result, it is not impossible to expect voluntary responses from the fashion retailers' side to address this issue, as it goes against their purpose to sell their products. Therefore, it is not impossible to expect these kinds of voluntary reactions from the fashion retailer's side to do something about this problem, as it contradicts their intention to sell their products. Slow fashion is centered on three primary principles: making items that last, employing ecologically friendly materials, and reducing consumption in various ways. The zero-waste principles have also eliminated textile waste by encouraging firms to be more innovative in their process development. Slow fashion is based on three main principles: creating durable products, using environmentally friendly materials, and creating products that reduce consumption in various ways. Moreover, by allowing the enhancement of the creativity of the design processes, textile waste has been reduced by the zero waste principles. (Dissanayake, 2017) Upcycling does have the advantages of using waste as a source, diverting it from landfills, and decreasing energy consumption and other adverse environmental effects. Using waste as a source material, diverting it from landfills, and reducing carbon emissions and other negative environmental impacts are the advantages of upcycling, and it creates cost-effective reuse of limited resources.

III. METHODOLOGY

The data for this study was collected utilizing an experimental approach, which involved controlling and influencing variables. This descriptive information was gained by witnessing the experiments carried out utilizing various types of waste materials collected from Sri Lankan fashion retailers. The product development process is carried out by creating innovative textile prototypes. These are a collection of fabrics of different sizes and shapes come in a variety. The fabric waste consignment includes fabrics of various weights as well as fabrics of different colors and patterns. The waste includes raw materials such as cotton, satin, viscose, velvet, muslin, silk, chiffon. Creating a Foundation for Experiments: This research brings a new life to discarded fabrics, experimenting with fabric manipulation techniques and enhancing different sewing and machinery techniques while collaborating on pre-consumer fabric waste. The waste fabric pieces were chopped and sliced into tiny bits for these tests. It has been employed to produce the experiment base and break it into small pieces

since it makes the prayer edges. To create the base for the experiment, the torn, chopped and cut waste fabric pieces were randomly laid on top of the base fabric. In particular, the fabric pieces are on several scales. Therefore, multiple waste fabric layers have been used to finish the experiment. On the top of the waste fabric pieces, again, a base fabric piece has been used to finish the base structure of the experiment. This business line develops textile catalogues for different consumer segmentation by following REusing, RE-making sustainable concepts while incorporating and reducing fabric waste. Also, it incorporates trends in producing high-quality, stylish, modern, and innovative design features under different principles of sustainability.

- Reusing - Further reusable but discarded fabrics are used for these products
- RE-making & reducing – introducing creative and functional textile designs

Pre-production process- Design development process.

The process of making these designs is a bit difficult. The design process should be done in such a way that the fabric waste is kept to a minimum and in line with current trends. Mainly single needle lockstitch machine and overlock machine are used for the sewing process. Finishing methods such as facing and lining are used to get a good finish to the garments. Also, in some cases, hand sewing techniques have to be used, and the fastening techniques currently used in the industry are being used.

A. Experiment 01:

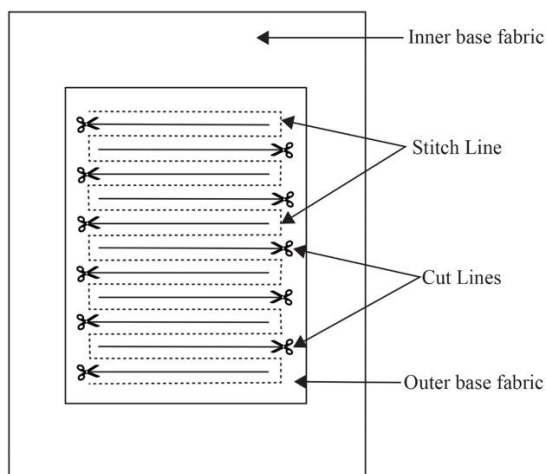


Figure 1: Experiment 1

Stitch lines were used on the top of the experiment base to fix the waste fabric layers and the base fabric. In experiment 01, the vertical stitch lines with the exact distances were made using the single needle lock stitch machine with the wanted colour threads. Because of the vertical stitch lines, the cuts to the outer base fabric are also vertical. The cut lines are in between the stitch lines. Because of the cuts, the waste fabric pieces have been popping up on the outer.

B. Experiment 02:

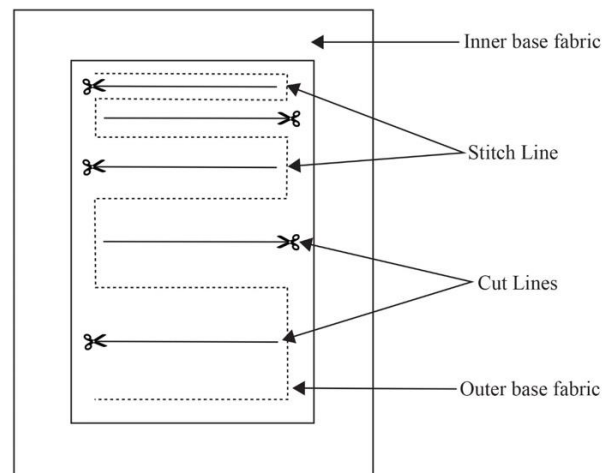


Figure 2: Experiment 2

Here, the vertical stitch lines have been used to fix the waste and base fabric pieces together at different distances. If the distances between the stitch lines are different, the cut lines are vertical. Because of the different distances between the cut marks, the pop-ups are not all at the same distance.

C. Experiment 03:

The horizontal stitch lines have been used to fix the base of the experiment. For this experiment, the horizontal stitch lines were used at the exact distances as in experiment 01. The pop-ups can be seen at the exact distances because the cut marks have been used between the stitch lines.

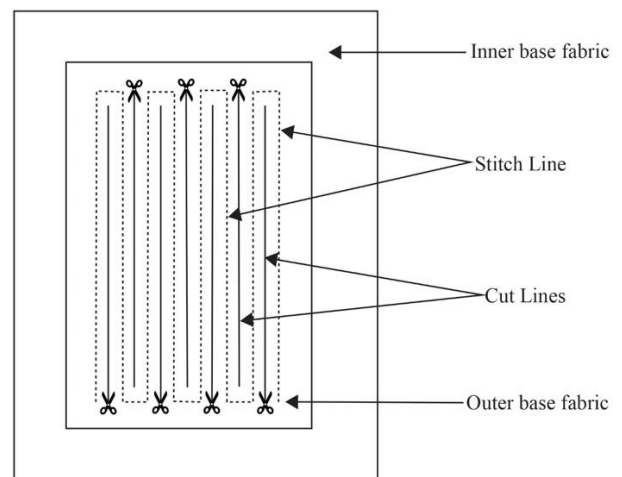


Figure 3: Experiment 3

D. Experiment 04:

As in Experiment 02, the distances between the stitch lines are different, but the way the stitch lines are is the same as in Experiment 03. The pop-ups are horizontal and at different distances between the stitch line and the cut marks.

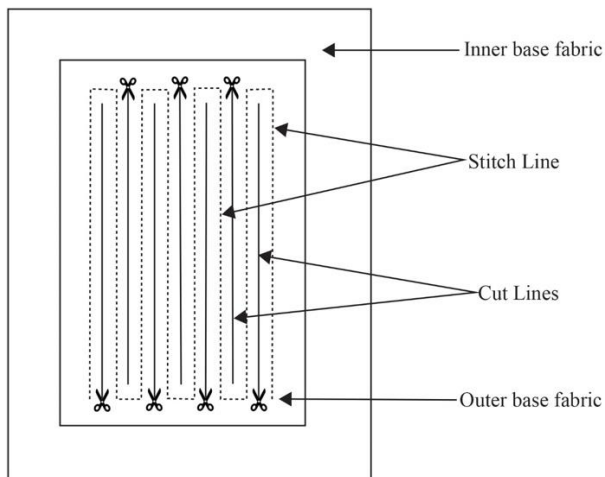


Figure 4: Experiment 4

E. Experiment 05:

Both vertical and horizontal stitch lines have been made using the single needle lock stitch machine on the top of the experiment base. Later, put cuts in between the stitch lines to pop up the underneath waste fabric layer. Damaging the yarns of the base fabric and making them visible underneath the second fabric layer is the value addition of Experiment 05.

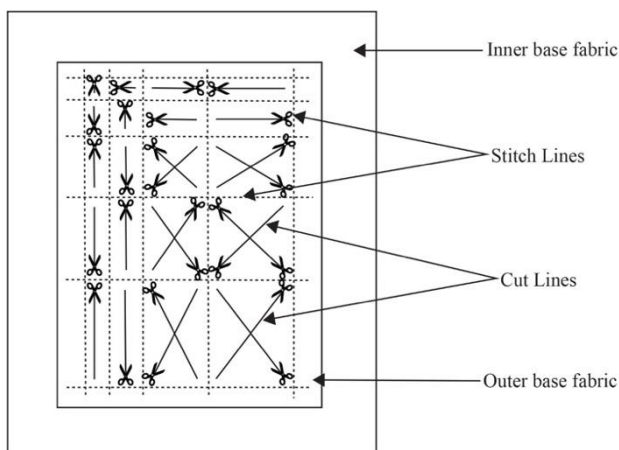


Figure 5: Experiment 5

F. Experiment 06

The other method is to grind the edge of the base fabric of the base of the experiment. Because of the grinding, the waste fabric layer is visible. This method has probably been used as the styling of them.

G. Experiment 07

This method was used as an applique of waste fabrics. Here, the waste fabric pieces were randomly used as an applique, and stitch lines were used to fix the design to the base fabric. The color of the threads can be used according to the design. Furthermore, according to the design, different types of stitch lines like zig, zag, and double-needle.

IV. DISCUSSION AND ANALYSIS

The prototypes thus created are evaluated by the customer. This involves interacting with questioners and customers, taking into account criteria such as the feel, comfort, look and price of the textiles. Here, ten customers are given prototypes to test the comfort of their clothes and their opinions are collected. Consumers' opinions and preferences are also sought through online methods such as social media. In this study, the data was gathered according to the qualitative approach using the experimental method. In experiment 01, the stitch line is at the same distance as the cut lines are at the same distance. Therefore, the design has a similar appearance throughout the whole design. However, in Experiment 02, the stitch line is not the same distance, and the cut lines are not the same distance. Therefore, the pop-ups of Experiment 02 are different from Experiment 01. Furthermore, Experiment 03 is identical to Experiment 01, with the only difference being the placement of the cut marks and the stitch line. So, Experiment 01 and Experiment 03 have a similar look. However, experiments 4 and 2 have a different look because of the different distances between the stitch lines and the cut marks. In experiments 01 and 02, the cut lines are in the weft way with the cuts. Therefore, the weft threads of the base fabric have opened. The cut marks of Experiment 03 and 04 are horizontal, and the warp threads of the base fabric have been opened because of the cuts. Considering the weave of the base fabric is affected by the styling. A plain weave is more suitable for the base fabric because it quickly opens the yarns with a straight cut. Twill weave is suitable too. However, it does not open the yarns like the plain weave because the yarns of the twill weave are tighter than the plain weave. Therefore, the vertical or horizontal cuts can be opened to the warp or weft threads in the plain weave, but the twill weave cannot be opened to the warp and weft threads quickly like the open weave. In Experiment 05, the stitch lines are horizontal and vertical, and there is not any unique way to put the cut marks because the base for the experiment has been fixed in both ways. Therefore, the waste fabric layers have been fixed well, and the pop-up cut marks are different from the other experiments. Moreover, Experiment 06 has been finished using the grinder. Here, the base fabric has been ground to damage the warp and weft of the base fabric. Instead of the cuts here, grinding has been used to lift the waste fabric layers. This method has probably been used on the edges, like the hemlines of the garments. In Experiment 07, the different types of waste fabric pieces used as the outer applique design have been used in different scales according to the designs. Also, the threads and stitch types are used according to the design and the designer's desires. All of these experiments are placement value additions. The colors and materials can be used according to the designers' desire.

V. SUGGESTIONS AND CONCLUSION

Problem-solving process and Limitations of the method

1. Increased time and effort - The main problem faced in the product development process is the increased time and effort required to sew these garments.
2. Finishing of the product.

3. Made from a tiny piece of fabric – This concept products include changeable textile designs. Such innovative textiles are very limited within the Sri Lankan fashion market. Made from a tiny piece of textile waste., our products look different from those on the market. That is why someone who uses our product is unique among others.
4. Limited number of pieces - large number of textiles of the same design towards the mass market. Due to the diversity of materials available, only a small number of people in the world can pull off our products of the same design due to the small number of materials available.
5. Business identity – these textiles are created by adding several small pieces of fabric and layers. As such, the potential for someone else to make a product that takes on a similar look is very limited. The uniqueness of the consumers who purchase these products is protected.
6. Uniqueness - The most important thing is that if a customer wears this dress, he or she will wear a design made of fabric that people have decided is the end of life but can live longer, such as resurrecting someone who has ended their life. It also enables consumers to avoid the possibility of polluting the environment in which we live. They can use these products with that pride in mind.

Waste material-based business opens a new route to sustainability and the world. The present research aimed to create prototypes for a sustainable base social entrepreneur business concept to reuse fabric waste and enhance sustainability.

As main objectives are

1. Reducing the amount of fabric waste added to the environment
2. Study the opportunities to make maximum use of the fabric produced.
3. Socializing and promoting the concept of sustainability
4. Encouraging young people to be entrepreneurial through the introduction of new business concepts

Also, this observation provides solutions to a significant global crisis socially, economically, and environmentally.

1) Socially

- To introduce and establish the concept of sustainable fashion in Sri Lankan society.
- Creating new job opportunities
- Creating and strengthening small scale entrepreneurs
- Opportunity to convert discarded cloth into cash

2) Economically

- Reducing the cost of textile waste management
- Saving money spent on importing textiles abroad
- The tourist-rich niche market that values sustainable products.
- Increase in Sri Lanka's G.B.P. due to the creation and strengthening of small-scale entrepreneurs

3) Environmentally

- Minimize the amount of textile waste that accumulates heavily in the environment
- Extending the life of a fabric
- Ability to save energy expended on textile waste management

These new surface decoration techniques have been introduced as a value addition for the fashion industry. This innovation has created a sustainable value addition, and it's a solution to the massive content of the fashion industry's material waste, which will be landfilled. This is a handcrafted value-adding technique and a new business opportunity for local artists without material cost. The value of these kinds of value-adding techniques is very high because they resume the time lot. This technique has been suggested for small parts but not for huge parts. Because of the thickness of the value addition, the garment's weight is very high. Furthermore, the color separation may differ depending on the designer's waste material collection. According to the material collection, color balancing can be carried out. As for the value, an addition that has been created cannot be entirely recreated as before since it is handcrafted and not a machinery-based one. However, these value additions can be introduced as designer-level value additions because of the time and the difference in design. The most recommended weave for the base fabric is plain weave because this weave easily opens the warp and weft with a single cut. In addition, the praying edges of the plain weave fabrics are way more suitable for using different types of value additions. This value-adding technique drives the fashion industry toward environmental sustainability. Somehow, handcrafted value additions create more job opportunities for ethical sustainability from different perspectives. It enhances sustainability apart from the conventional value-adding techniques.

BIBLIOGRAPHY

- [1]. Brown, R. (2021, January 8). RoadRunner Recycling. Retrieved from RoadRunner Recycling Inc: <https://www.roadrunnerwm.com/blog/textile-waste-environmental-crisis>
- [2]. D.G.K. Dissanayake, D. W. (2018). Developing a compression moulded thermal insulation panel using postindustrial textile waste. researchgate publication at: <https://www.researchgate.net/publication/327173880>, 356-358.
- [3]. D. G. K. Dissanayake, D. W. (2020). Managing post-industrial textile waste: current. The Journal of The Textile Institute, 8.
- [4]. Dissanayake, D. P. (2017). A case study from handloom industry. Springeropen .
- [5]. Elahe Saeidi, V. S. (2017). Precious cut: exploring creative pattern cutting. International Journal of Fashion Design, Technology and, 12.

- [6]. Elahe Saeidi, V. S. (2017). Precious cut: exploring creative pattern cutting and draping for zero-waste design. International Journal of Fashion Design, Technology and Education.
- [7]. Gazzola, P. (2020 March 16). Trends in the Fashion Industry. The Perception of Sustainability and Circular Economy: A Gender/Generation Quantitative Approach. <https://www.mdpi.com/journal/sustainability>.
- [8]. Howell, B. (2021). Top 7 Most Polluting Industries. eco research, <https://www.theecoexperts.co.uk/blog/top-7-most-polluting-industries>.
- [9]. Jacometti, V. (2019, October 1). Circular Economy and Waste in the Fashion Industry. Retrieved from https://www.researchgate.net/publication/336934228_Circular_Economy_and_Waste_in_the_Fashion_Industry
- [10]. News European Parliament. (2021, February 10). Circular economy: MEPs call for tighter EU consumption and recycling rules. Retrieved from News European Parliament: <https://www.europarl.europa.eu/news/en/press-room/20210204IPR97114/circular-economy-meps-call-for-tighter-eu-consumption-and-recycling-rules>
- [11]. Park, C. (2016). Higher Value Innovation for Industrial Textile Waste in Sri Lanka. United Kingdom: TransTextile Project.
- [12]. Pavione, E. (2020 March 16). Trends in the Fashion Industry. The Perception of Sustainability and Circular Economy. researchgate.net.
- [13]. POPP, D. (2021, February 10). News European Parliament. Retrieved from News European Parliament: <https://www.europarl.europa.eu/news/en/press-room/20210204IPR97114/circular-economy-meps-call-for-tighter-eu-consumption-and-recycling-rules>
- [14]. United States environment protection agency. (2017). environment protection agency . Retrieved from [epa.gov: https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/textiles-material-specific-data#TextilesOverview](https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/textiles-material-specific-data#TextilesOverview)

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