

Design and Development of Sustainable Denim Apparels through Up-Cycling

Abstract

Denim industry is facing many criticisms due to huge amount of water and energy consumption as well as hazardous nature of various chemicals being used throughout from raw material extraction till disposal phase. So the purpose of the study is to design and develop sustainable denim apparels through up cycling approach based on consumer's denim preferences as well as upcoming eco-denim trends. A series of prototype denim apparels from the discarded and waste denim materials have been redesigned to give it a new life saving natural resources like raw materials, water as well as carbon footprints. The study has its significance to highlight the importance of socially and environmentally responsible design and will give a new insight to designers, developers and researchers to formulate a blueprint of sustainable product design process.

Keywords: Denim, Up Cycling, Discarded Denim, Sustainable Denim
Introduction

Textile and apparel industry play a very important role in global economy but at the same time it has been condemned as one of the most polluting industry. Denim industry which is an important sub-sector of the textile industry has done a great damage to the environment as well as to the human health. Various chemicals are being used from raw material extraction to till the production of final product. The chemicals being used may be toxic and carcinogenic and may cause serious diseases. So looking at all these environmental concern, wide spread campaign all over the global are being done by various governments and NGOs to protect our environment in terms of saving natural resources, reducing pollution and their ell effects on human health. People are also getting more conscious about environmental concerns which have led the manufacturers, retailers, and designers etc. to adopt sustainable practices [1-3].

Review of Literature

In recent years denim fashion has gained a wide popularity and has been accepted as fashion item by all kinds of peoples irrespective of genders, ages, classes, occasion and location as well all over the globe. It is the most widely used fabric ever used in the history of attires or costumes [4]. Over the time since it evolved, many changes have happened. The cotton, which was originally used in denim, is being blended with different kinds of materials including synthetic fibers like Lycra to impart stretchable properties. This makes the denim comfortable, durable and stretchable. For denim construction, 3/1 (three up one down) and 2/1 (two up one down) twill weave are used. Twill weave, refers to diagonal lines running parallel, absorb a lot of friction which makes the denim fabric good abrasion resistant and great durability. Different kinds of garment can be made out of it which includes jackets, skirts, and jeans etc. Different kinds of ornamentation and finishes makes the denim very attractive but expensive as well.

With an increase in awareness among consumer, the denim industry is shifting towards sustainable production methods and eco-friendly jeans [5].

In recent years up cycling process is increasingly recognized as a promising means to reduce material and energy use. Up cycling refers to a process in which waste materials are converted into something of higher value and/or quality in their second life [6]. Up cycling enterprises are emerging now a days in develop countries and their brands have been.

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succeeded in creating stylistically relevant and commercial successful fashion styles utilizing waste textile materials. Up cycling offers a sustainable design approach in reducing carbon footprints, saving natural resources and is employed for environmental benefit [7].

So looking at the popularity of the denim fashion and associated environment concerns, an attempt has been made by the authors to recreate the discarded denim apparels into sustainable design to exhibit and highlight the importance of socially and environmentally responsible design.

Objective of the Study

Looking at the vast amount of damage, the denim industry has done to our environment, the objective was to develop prototype of various sustainable denim designs from discarded denim apparels through up-cycling which can inspire other designers and researcher to highlight the importance of socially and environmentally responsible design.

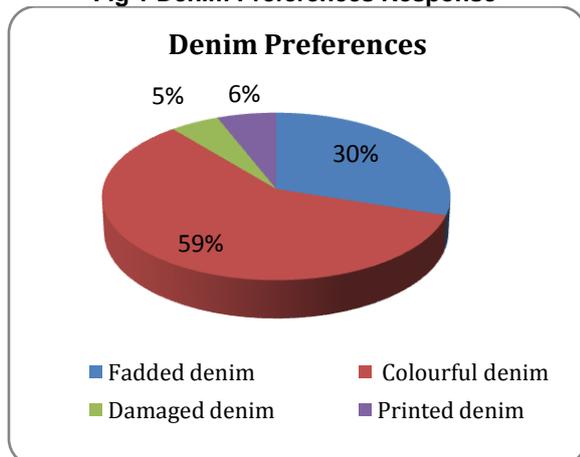
Research Methodology and Design Approach

A vast amount of literature review was carried out to know the traditions, current trends and projection of upcoming designs not only in denim but overall to develop a series of unique kinds of denim apparels. Customer survey was also carried out to know their preferences as well as feedback of creative design ideas. Design ideas were materialized through sketching, pattern making and modifying further to make them appreciable.

Results and discussion

Survey of sixty female customers in Indian capital NCR region was carried out in prime located malls & shopping complexes. Majority of the respondents (around 76%) were in the age group of 16 to 35. They were asked about their denim preferences. The female responded their preferences for faded denim, playful colorful denim, acid wash denim and printed denim. The response have been plotted in Fig.1

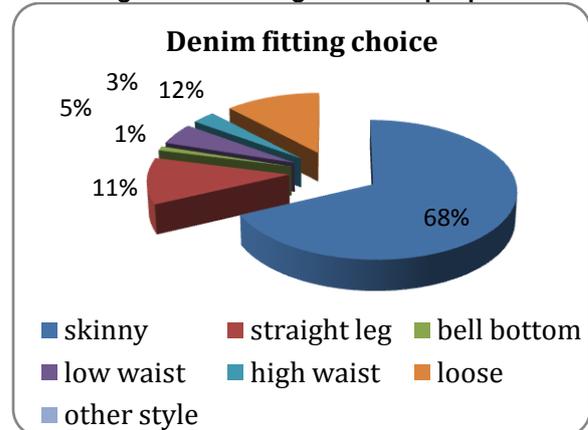
Fig 1 Denim Preferences Response



Fitting choices were also asked and the response is plotted at Fig. 2

Similarly opinions were also noted about non-denim ladies wear as well as their preference for accessories.

Fig 2 Denim fitting choice of people



Material

Based on all these, sketches were created the detail of which is discussed subsequently in following section.

Raw material was procured from discarded and old denim apparels as well as non-denim ladies wear. Discarded accessories were also collected.

Prototype 1: One Piece Denim

Fig. 3: Recycled one piece denim dress



Design Description

1. Recycled one piece denim dress stitched by using discarded denim /jeans.
2. In this recycled one piece denim dress, old buttons, golden and blue colour lace was used and placement of their design on dress is shown at Fig. 3 to enhance the outlook of dress.

Prototype 2: Denim Skirt

Design Description

1. Recycled denim skirt dress stitched by using discarded denim /jeans.
2. In this recycled skirt dress used metal button to hold on waist, frill design is used at bottom from the waste to give a different outlook to skirt. The prototype is shown at Fig. 4.

Fig 4 : Recycled denim skirt



Prototype 3: Recycled Denim Blouse

Design Description

1. Recycled denim blouse stitched by using discarded denim /jeans.
2. In this recycled top used a readymade design of neck in pink colour to enhance the outlook of blouse as shown in Fig 5

Fig 5: Recycled Denim Blouse



Prototype 4: Recycled denim skirt

Design description:

3. Recycled denim skirt dress stitched by using discarded denim /jeans.
4. In this recycled skirt dress, used metal buttons to hold on waist, cotton fabric lace at bottom of skirt, another cotton fabric of green colour as well as stiffly lace in centre of skirt in sea-green colour was used to enhance the outlook of the dress. The prototype is shown at Fig 6.

Prototype5:Recycled Denim Skirt Apparel Product

Fig 6 Recycled Denim Skirt



Design Description

Recycled denim skirt dress stitched by using discarded denim /jeans.

Fig :7 Recycled Denim Skirt



In this recycled skirt dress used metal button to hold on waist, cotton fabric green lace at bottom and diagonally used in centre of skirt to giving the pleasant outlook to skirt. Image of designed denim dress is shown in Fig 7.

Prototype 6: Recycled Denim Top

Design Description

1. Recycled denim top stitched by using discarded denim /jeans.
2. In this recycled top used a readymade golden stone patch, to emphasize the outlook of top. A zipper is used for opening and closing purpose. Image of dress shown in Fig. 8.

Fig 8: Recycled Denim Top Apparel Product



Prototype7: Recycled Denim Trouser

Design Description

1. Recycled denim trouser stitched by using discarded denim /jeans.
2. In this recycled dress used fabric patches in alphabet design to giving the pleasant outlook to trouser. The Image of the dress is shown in Fig. 9

Fig. 9: Recycled Denim Trouser**Prototype 8: Recycled Denim Apparel
Design Description**

1. Another recycled one piece denim dress stitched by using discarded denim /jeans.
2. In this recycled one piece dress used colorful lace at the bottom and two variation of blue colour Denim, to enhance the outlook of dress. Image of the dress is shown in Fig 10

Fig 10 Recycled One Piece Denim**Prototype 9: Recycled One Piece Denim
Design Description**

1. Recycled denim one piece dress stitched by using discarded denim /jeans.
2. In this recycled skirt dress, used button and blue denim lace at the straight centre of dress and sateen fabric of blue colour were used to give smocking design effect at the upper half of the top, giving the pleasant look to dress as shown at Fig. 11.

Fig.11: Recycled One Piece Denim**Conclusion**

In the last decade, fashion industry has driven and encourage the consumers to discard their garments at a faster pace in spite of retaining their quality attribute just because that item is no longer at the fore front of new trends. But now with growing environmental awareness, people are adopting sustainable designs. So looking at all these concerns in mind, up-cycled approach was adopted in denim fashion which is the most popular and exerts least burden on the environment as compared to other fabrics. Customer survey reveals that if the sustainable denim products are available, they will be willing to try the eco-fashion. The design and development of the sustainable denim apparels gave new environmental insights into the possibility of new creations in denim fashion. Authors are of the opinion that up cycling utilizes textile waste to create products with a higher retail value than traditionally recycled goods. It is finally concluded that if we have the will to safeguard our environment, most of the waste can be converted into useful materials.

References

1. Pal, H (2017), "Environmental Issues in Textiles: Global Regulations, Restrictions and Research. In: Muthu S.S (eds) Detox Fashion. Textile Science and Clothing Technology. Springer, Singapore, pp 27-45
2. Pal, H, Chatterjee, K N, Sharma, D, (2017) "Water footprint of denim industry", Muthu S S, "Sustainability in Denim" Woodhead publishing, pp 111-123
3. Pal, H, Chatterjee, K N, Sharma, (2017) "Environmental Issues and Sustainable Trends in Denim Industry", in proceedings of National Conference on Fashion Apparel and Textile (NCFAT'17), Excellent publishing house, New Delhi, pp 94-97
4. Annapoorni, S. "Introduction to Denim" in Sustainability in Denim, Elsevier Publications. <http://dx.doi.org/10.1016/B978-0-08-102043-2.00005-8>
5. Amutha, K. 2017. "Environmental Impacts of Denim" in Sustainability in Denim, Elsevier Publications. <http://dx.doi.org/10.1016/B978-0-08-102043-2.00005-8>
6. Kyungeun Sung , A Review on Upcycling: Current Body of Literature, Knowledge Gaps and a Way Forward, Venice Italy Apr 13-14, 2015, 17 (4) Part I, downloaded from http://irep.ntu.ac.uk/id/eprint/12706/1/219287_PubSub1825_Sung.pdf
7. Sara L. C. Han, Priscilla Y. L. Chan, Praburaj Venkatraman, Phoebe Apeageyi, Tracy Cassidy & David J. Tyler(2016) Standard vs. Upcycled Fashion Design and Production, Fashion Practice, 9:1, 69-94, DOI: 10.1080/17569370.2016.1227146

Website

8. <https://sourcingjournal.com/denim/denim-brands/denim-trends-for-2018-95769/>
9. <http://alwaysbrainstorming.com/trend-watch/an-exclusive-look-at-the-denim-trends-for-2018/>

10. <https://www.sciencedirect.com/science/article/pii/B9780081020432000022>
11. <https://www.ecowatch.com/environmental-cost-jeans-2544519658.html>
12. <https://www.infosurv.com/customer-attitude-survey/>
13. https://www.consumerpsychologist.com/cb_Attitudes.html
14. <https://www.linkedin.com/pulse/types-denim-fabric-used-garments-manufacturing-wings-2-fashion>
15. <https://www.linkedin.com/pulse/types-denim-fabric-used-garments-manufacturing-wings-2-fashion>
16. <https://www.ukessays.com/essays/marketing/jeans-market-in-india-history-marketing-essay.php>
17. www.textile.archorma.com
18. <http://www.levistrauss.com/wp-content/uploads/2014/01/A-Short-History-of-Denim2.pdf>
19. <http://www.textileschool.com/articles/355/denim-fabrics>
20. https://en.wikipedia.org/wiki/Denim_enquiry@jgtextile.com
21. http://www.ehow.com/list_7435562_materials-used-make-jeans.html
22. <https://www.bustle.com/articles/102310-an-illustrated-history-of-denim-from-bell-bottoms-to-boyfriend-jeans-and-everything-in-between> An Illustrated History of Denim — From Bell Bottoms to Boyfriend Jeans
23. <http://textilelearner.blogspot.in/2013/11/what-is-denim-different-types-of-denim.html>
24. http://www.mackay.qld.gov.au/__data/assets/pdf_file/0017/176201/Organisational_Service-Monthly_Review_Report_-_October_2014.pdf
25. <http://daily.newlook.com/blog/february/2016/denim-through-the-decades-seventies-punk-ripped-jeans-pinafores-millie-mackintosh-selena-gomez-madonna-cher>
26. [http://textilelearner.blogspot.in/2014/08/overview-of-denim-fabric-types-and.html\(last\)](http://textilelearner.blogspot.in/2014/08/overview-of-denim-fabric-types-and.html(last))
27. <http://www.donnamorganblog.com/denim-through-the-decades/>
28. <https://fordhamram.com/2016/04/27/denim-on-denim-the-ultimate-jean-pool/>
29. <http://www.refinery29.com/2016/06/113514/jeans-style-evolution>
30. <http://alwaysbrainstorming.com/trend-watch/an-exclusive-look-at-the-denim-trends-for-2018/>