Royal International Global Journal of Advance and Applied Research
Peer Reviewed International, Open Access Journal.
ISSN: 2998-4459 | Website: https://rlgjaar.com Volume-2, Issue-9 | September - 2025

Original Article

From Waste to Worth: Rethinking Glove Industry Waste for Sustainability

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Manuscript ID:
RIGJAAR-2025-020906

ISSN: 2998-4459
Volume 2
Issue 9
Pp. 27-30
September 2025

Submitted: 04 Aug. 2025
Revised: 09 Aug. 2025
Accepted: 04 Sept. 2025
Published: 30 Sept. 2025

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Quick Response Code:

Web. https://rlgjaar.com

DOI:
10.5281/zenodo.17471184

DOI Link:
https://doi.org/10.5281/zenodo.17471184

Abstract

The textile industry is one of the largest industries globally and plays a crucial role in the economic development of many countries. Nearby one third of economic contribution is from textile industries in India. However, the industry also generates a significant amount of waste, making it a major problem of the pollution. This study was conducted using surveys and interviews to understand the nature and volume of textile waste to resolve this problem. The findings revealed that glove industries generate waste in the form of leftover fibers and rejected gloves during production. Rather than allowing this waste to contribute to soil and air pollution, it can be regenerated into useful products such as doormats, rugs, handbags and other household items. This process not only helps reduce environmental pollution but also decreases the demand for new fibers, leading to a more sustainable and circular economy. Recycling textile waste is not just an environmental necessity but also an economic opportunity. This study highlights the importance of sustainability in the textile industry and suggests effective ways to minimize waste and its negative impact on the planet.

Keyword: *Textile, Glove, Economy, rethinking, waste, industry.*

Introduction

A lot of waste is made from industries and people in day to day life. We need to reduce waste to protect our mother earth. The waste from the textile industry is called pre-consumer waste, which includes fibers, yarns, and fabrics. On the other hand, the waste from people is called post-consumer waste; they are old clothes, household items, and other used textiles. Textile waste is distinguished into two main types: pre-consumer waste, which comes from the manufacturing process, and post-consumer waste, which is from when products are used and then thrown away. Right now, post-consumer waste especially from the hosiery industry is becoming a bigger environmental problem. At the same time, waste from the manufacturing process itself is also causing a lot of pollution. Pre-consumer waste can be either re-workable or non usable. Wastes made before spinning, such as during carding, combing, or drawing, are considered re-workable. These materials can be used again in the spinning process without any extra work. This type of waste is usually clean and comes from places like retailers who sell things that weren't sold. These unsold items can go directly to their stores or to clearance centers. Retailers can also sell the waste to other stores or to people who buy in bulk and then resell it by making useful article by it. Another option is giving the waste to non-profit groups. Post-consumer waste is not re-workable and cannot be used in the production process without some kind of treatment.

Depending on the material, this waste is recycled using mechanical, chemical, or thermal methods. Post-consumer waste includes any clothes or household items like sheets or towels that people throw away because they are worn out, damaged, too small, or no longer in style. Rethinking of these wastes to develop useful article by them to make control over pollution and economical loss of the country. It can be regenerated into useful products such as doormats, rugs, handbags and other household items. Knotting, knitting and crocheting technique is used to make articles by this waste.

Objectives:

1. To study the waste generated from the Industry.
2. Fiber, yarn and Fabric all types of Waste can be studied.
3. To suggest most effective way to reduce waste.

Limitation:

1. Only Gloves Company is explored for the study.
2. Pre consumed Waste is selected for this study.

How to cite this article:

Machhirke, V. U. (2025). From Waste to Worth: Rethinking Glove Industry Waste for Sustainability. Royal International Global Journal of Advance and Applied Research, 2(9), 27–30.
https://doi.org/10.5281/zenodo.17471184

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Methodology:

Gloves are manufactured by two ways, one is by knitting and another way is bonding. Knitted gloves are used as clothing and bonded gloves are made for work purpose like- surgery laboratory, players, mechanics carpenter etc. Knitted gloves (cotton, wool, nylon, polyester, or blended yarns) are produced using flat knitting machines or circular knitting machines. During this process, waste is generated in several ways:

Types of Waste Generated

Yarn waste: End cones, leftover yarns, and broken yarns are the yarn waste. Short lengths yarns are unsuitable for reuse in production.

Rejected gloves: Gloves with knitting defects (holes, loose stitches, wrong sizing).Faulty batches from machine errors or operator mistakes.

Causes of Knitted Glove Waste in Manufacturing:

- Machine Setup Errors (tension imbalance, needle breakage)- When knitting machines are not properly set up, yarn tension may be too tight or too loose. This leads to defects such as holes, laddering, or irregular stitches. Needle breakage during operation can cause visible flaws in the fabric, making the gloves unusable. Such errors often require re-knitting or result in the rejection of entire batches.
- Quality Control Rejects (stitch density mismatch, uneven sizing)- During production, gloves must meet strict quality standards regarding size, shape, and stitch density. If the stitch density is inconsistent, the gloves may not provide proper fit, comfort, or durability. Uneven sizing across pairs makes them unsuitable for packaging and sale, leading to waste.
- Color Mismatch or Dyeing Issues (in post-processing)- Many knitted gloves undergo dyeing or finishing processes. If dyeing is inconsistent, gloves may show patchy colors, shade variations, or bleeding. This reduces their aesthetic and commercial value, leading to rejection. Even minor color mismatches can make gloves unsellable, especially when uniformity is required for bulk orders.
- Production Overestimation (extra gloves produced to meet order requirements)- Manufacturers often produce more gloves than the order specifies to cover potential rejects. If the rejection rate is lower than expected, the surplus becomes excess stock. These extra gloves may not always find a buyer, especially if they are size- or design-specific, creating additional waste.

Environmental Concerns;

Land filling of cotton/polyester blend takes years to degrade, may release microfibers. Synthetic waste in the form of nylon and polyester yarn contributes to plastic pollution. Also the energy & resources used for gloves manufacturing, dying, knitting and spinning are intensive

Waste Management and Recycling option-

Convert rejected gloves in a useful article, which may use as a household article like- doormat, rugs, kitchen

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cloth etc. converting rejects into industrial wiping rags or padding material. Also using them in nonwoven products (felt, automotive linings.)

Doormat made by waste gloves

Doll made by waste gloves

Handbag made by waste Yarn

(Article Made by Waste Generated from The Glove Industry)

The glove manufacturing industry plays a vital role in meeting the demands of healthcare, industrial safety, and domestic needs. However, like many manufacturing sectors, it also generates a significant amount of waste in the form of leftover fabric, rejected pieces, and other by-products. If left unmanaged, this waste can contribute to environmental pollution and unnecessary landfill accumulation. Therefore, adopting systematic waste management practices is not just an environmental responsibility but also an economic opportunity. One of the most effective ways to manage glove industry waste is by recycling and regenerating the leftover material. Instead of discarding the waste, it can be creatively transformed into useful and decorative articles. For example, small mats, doormats, table covers, and handbags can be made from waste gloves. With further innovation, soft toys like teddy bears and other household items can also be made. These products not only reduce waste but also have a value in market due to their affordability and uniqueness.

Such practices bring multiple benefits. As they reduce the environmental burden by cutting down on waste that would otherwise end up in landfills. Also they provide additional employment opportunities to workers engaged in recycling and handmade product creation. This encourages small-scale entrepreneurship and supports local people to get entrepreneurship. To sale this product one get income for their families. On a huge way, efficient waste management in the glove industry helps to develop the economy of the country. It promotes sustainable development by turning waste into wealth. By integrating these practices, industries can move towards greener production systems while ensuring economic growth and social benefits.

Result/ Discussion:

Waste generated in the glove industry should not be seen as a problem but it is necessary to try to make empowerment source. With proper waste management and proper reuse, it is possible to reduce environmental impact, generate employment, and contribute to the economy. This approach reflects a sustainable direction that not only benefits industries and workers but also creates a healthier and more resource-efficient future for the entire livelihood.

Conclusion:

Hosiery recycling is necessary for both, environmental and economic benefits. It avoids many polluting and energy intensive processes that are used while making products from fresh materials. Glove waste is recycled into new raw materials for the doormat, teddy bears, handbag, and other useful articles. Recycling waste is essential to reduce waste. It also helps to get opportunity to become employed to the other people and make profit from the waste too.

Acknowledgement

I am Vanita U. Machhirke, Head of Textile and Clothing Department, S.S. Girls' College, Gondia like to express their sincere gratitude to R.T.M. Nagpur University, Nagpur for providing the necessary facilities and support to carry out this research. I am also thankful to my guide, Dr. Varsha Mankiw Madam, for their valuable guidance and insightful suggestions during this study.

Special thanks are extended to Vikash Trading Company, Tirora. It is located at Tirora Dist., Gondia, Maharashtra. The owner of the industry is Parwatidevi Kalyanshing Rajpurohit, who provided support and permission for data collection, analysis, and experimentation.

Financial support and sponsorship

Nil.

Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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