

Waste isn't waste until we waste it

Repair as a best-practice in reducing pre-consumer industrial fashion waste

By Ramesh De Silva

The global textile industry today is massive. Fuelled by the apparel, home, automotive, and other industries, it is the biggest it has ever been. The apparel industry alone is a \$1.8 trillion industry, producing 150 billion garments each year, that's nearly 19 items for every human being on the planet



Fashion Waste

Fashion industry generates a staggering 13 million tons of waste annually. To put that into perspective, it's equivalent to the weight of an empty Burj Khalifa multiplied by 24 thousand! Despite this alarming statistic, the industry's incessant production of inexpensive, disposable clothing persists, further exacerbating the issue.

Pre-Consumer Textile Waste

When addressing textile waste problem, at most times the topic revolves around fast fashion and the disposal of clothes at the end of their life. But there is already a problem a few steps back in the manufacturing process which refers to as Pre-consumer waste, all the waste materials that are created in the supply chain during manufacturing of a product.

Unlike post-consumer waste, pre-consumer waste has a higher possibility to divert from a landfill or an incinerator as the fabric or the garment is essentially brand new (unlike post-consumer waste), despite one or more repairable defects. And often, some of these defects are not noticeable to an average shopper.



With the expansion of the fashion industry the quantity of pre-consumer textile waste has increased. Whilst globalisation, outsourcing, offshoring, continue to be important drivers of competitive advantage. One downside of these strategies is that they can increase supply chain complexity.

The fashion industry produces significant waste due, in part, to its complexity and the disconnection between players along the value chain. Retailers, brands, garment manufacturers, textile mills, and accessory suppliers, as well as various departments within these entities, often operate independently, resulting in significant inefficiencies in the supply chain. Each entity tends to order excessive amounts and

build-in buffers to account for potential situations that may prevent them from fulfilling customer orders.

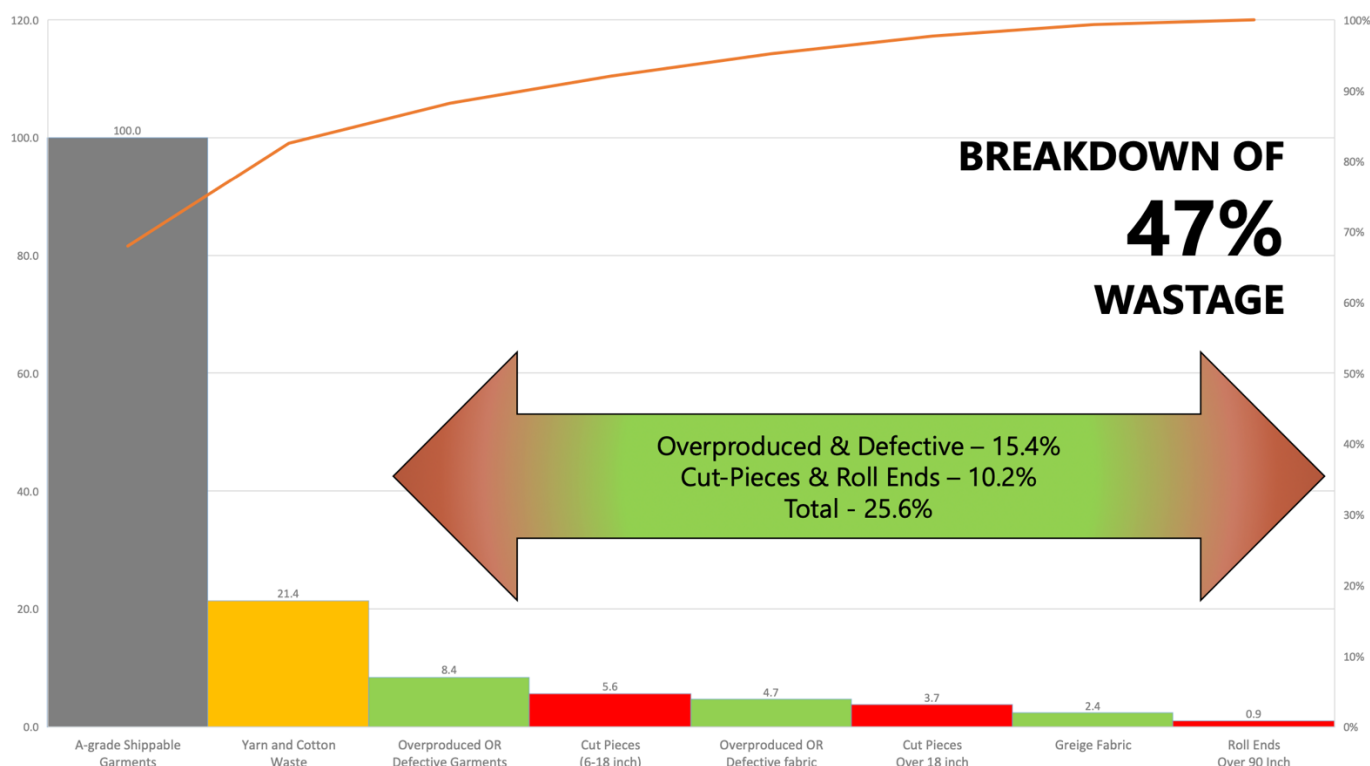
Most common pre-consumer waste happens, firstly, due to over ordering, manufacturers order 3-10% more material than necessary, some luxury brands even get their manufacturers to destroy their overstock to protect their brand and its unique designs. Secondly, inconsistencies in fabric. Producing textiles in huge volumes results in weaving errors, printing errors and colour variations. Thirdly cutting residues, when fabrics are marked, laid, and cut out into desired shapes and sizes, even with conscious effort as much as 8-15% of the fabric, referred to as textile scraps and roll ends can end up on the cutting room floor.



Another form of pre-consumer industrial waste is the, cutting and sewing related damages due to human negligence such as tiny holes, stains, oil marks, etc.

Pre-consumer waste or the fallout is in the form of semi-processed or processed textile rolls and semi-processed or processed garments. Often, this waste is discarded, incinerated, or sent to a landfill.

Based on a research project done at OCAD University, Ontario, Canada, on average, 35% of all materials in the supply chain end up as waste before a garment or product reaches the consumer and 47% of all fibre entering the fashion value chain becomes waste throughout the myriad of different stages of production from fiber, yarn, fabric up to a garment.



In summary, yarn and cotton waste account for 21.4% of total wastage. There are some systems in place for value recovery of cutting-room waste, but in most cases, the scrap material is being turned into low-grade material down the value chain, thus losing the value of the scraps to be used in its highest value, in fabric form. Or in the worst case, it ends up in a landfill or incinerator. There are some amazing programs turning denim scraps into building insulation, melting polyester or nylon scraps into new yarns, and age-old process of recycling cashmere and wool into new yarns. Yet these programs are mainly limited to fabrics that are nearly 100% of a single fibre, leaving not much else to do with the ever-popular blended fibre fabrics.



Over-produced and defective fabric and garments accounts for 15.4% of waste and cut pieces and roll end account for 10.2%. Most of this waste, totalling 25.6% could be reduced by changing processes within the supply chain and by adopting age-old practice of mending or repairing of defects.

Reusing pre-consumer textile waste

So, finding ways to re-use or use up the resources already created is the most important way to create an endless supply of materials without further depleting natural resources. The two most popular fabrics in the world, polyester and cotton, are already putting a strain on the environment, and this situation will only get worse. The average apparel factory throws away 60,000 pounds of usable, pre-consumer excesses every week.

So, repairing pre-consumer textile waste within the fashion supply chain offers many environmental advantages, including, directing waste away from landfill and incinerators, and conserving resources and providing a solution for the current shortages of natural resources and virgin fibres

Repairing

Repairing clothes is a better way to reuse old clothes without going through the textile recycling process that is energy and resource intensive. This is not a new concept, garment repairing or mending originates from the 1930-40s, when families had very little economic ability or material resources during the World Wars. Even today, repairing is a way of life for people in developing and developed countries as repairing and restoring a garment



is far cheaper than buying a new one and by extending the life of clothing, garment repair reduces the demand for new clothing production, which is one of the most resource-intensive and environmentally damaging aspects of the fashion industry.

Repairing Post-consumer fashion

Garment repair is a promising circularity business model for reducing post-consumer waste and for fuelling the recommerce market, which has now become the latest buzzword among brands to reduce the heaps of waste piling up in cities.

The EU Commission is currently proposing a directive on common rules promoting the repair of goods. This proposal affects producers who sell their goods and sellers who sell third party goods in the EU, including those established outside the EU, and provides new space for repair service providers. Repair of defective goods will now have priority over replacement.

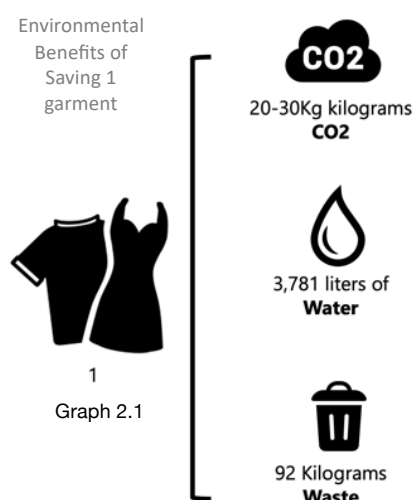
There are several benefits to garment repairing. First, it helps to reduce waste by keeping clothing in use for longer, which in turn reduces the amount of clothing that ends up in landfills. Second, it help to promote a more sustainable and conscious approach to fashion consumption. By repairing and maintaining their clothing, consumers can learn to appreciate the value of quality garments and reduce their reliance on fast fashion.

Repairing Pre-consumer fashion

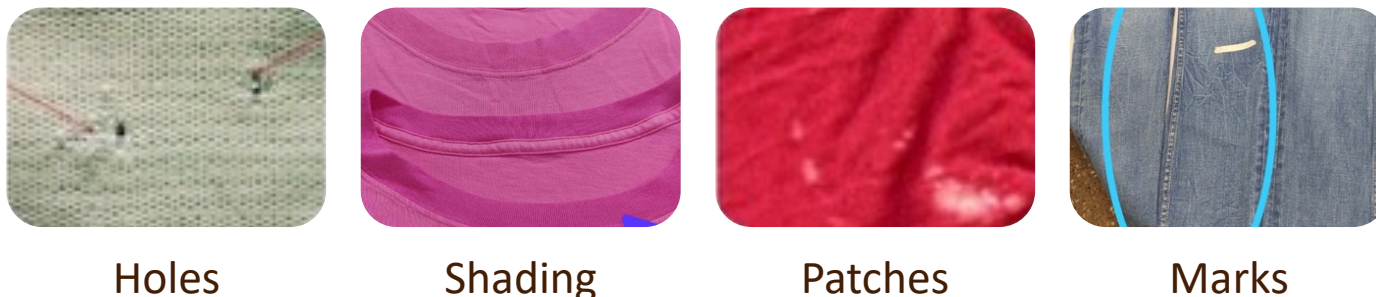
Garment repair is also a promising circularity business model for reducing pre-consumer industrial waste. This approach involves repairing and restoring damages found in the textile manufacturing process. Textile repair is most certainly a low hanging fruit in driving sustainability in apparel manufacturing, especially when it comes to reducing waste and reducing the need for virgin resources.

Repairing a new garment is far easier than repairing a worn-out garment. As indicated on graph 2.1, repairing one garment can save approximately 20-30 kgs of CO₂, 3781 litres of water and 92 kgs of waste.

There is 60+ different defects found in textile manufacturing, and most are repairable. By investing in repair infrastructure, apparel manufacturers can help build a more sustainable and resilient economy. Garment repair can create new job opportunities in the repair and refurbishment sector, which can help support local economies and communities.



Most common defects found in textile and apparel manufacturing.



Graph 3.1

60+ other less frequent defects found in textile and apparel manufacturing.

1. Defects from Yarn <ul style="list-style-type: none"> ✓ Thick and thin ✓ Slub ✓ Hairiness ✓ Knots ✓ Excessive weak and hard yarn ✓ Spun in fly ✓ Kitties ✓ Mix yarn ✓ Oily slub ✓ Loose yarn ✓ Slough off ✓ Unevenness ✓ Lot mixing ✓ Splice 	<ul style="list-style-type: none"> ✓ Fabric press off ✓ Spirality ✓ Broken stitch 	5. Defects from Finishing <ul style="list-style-type: none"> ✓ Bowing ✓ ✓ Spirality ✓ High shrinkage ✓ GSM variation ✓ Tonal variation ✓ Skewing or bias ✓ Loose thread ✓ Fold mark ✓ Squeezer mark ✓ Water mark ✓ Pinhole ✓ Pilling ✓ Inadequate pressing 	<ul style="list-style-type: none"> ✓ Staggered stitch. ✓ Defected stitch. ✓ Oil spot or stain.
2. Defects from Machine Setting. <ul style="list-style-type: none"> ✓ Unevenness ✓ Broken ends ✓ Lycra out ✓ Missing yarn ✓ Hole 	3. Defects from Knitting Equipment <ul style="list-style-type: none"> ✓ Needle mark ✓ Sinkar mark ✓ Drop stitch 	6. Defects from Sewing <ul style="list-style-type: none"> ✓ Needle damage. ✓ Skipped stitch. ✓ Thread drawn-off. ✓ Seam puckering. ✓ Wrong stitch density. ✓ Uneven stitch. 	7. Seaming Defects <ul style="list-style-type: none"> ✓ Uneven width. ✓ Uneven seam line. ✓ Not secured by backstitch. ✓ Twisting. ✓ No matching of check or stripe. ✓ No matching of the seam. ✓ Unexpected materials are attached whilst sewing. ✓ Not sewn by matching face side or back side of fabrics. ✓ Use of wrong stitch type. ✓ Wrong shade matching of sewing thread.

Graph 4.1

Research indicates that 95% of fashion industry emissions stems from upstream activities before the garments are exported, and out of which, 90% of that emission happen even before the fabric is laid on the cutting table. Typically, Supply chains account for more than 25 percent of global CO2 emissions and on average, supply chain emissions are 5.5 times higher than a company's direct emissions.

Finished textile and garments that have been produced but cannot be exported due to some defect, the creative, physical, financial, and especially the natural resources invested in them are lost. By delving into the roots of pre-consumer waste, it becomes clear that optimizing supply chain processes and ensuring tried and tested circular business model such as repairing is not only critical for business performance, but also plays a crucial role in combating climate change.

Benefits of repairing to the textile manufacturers

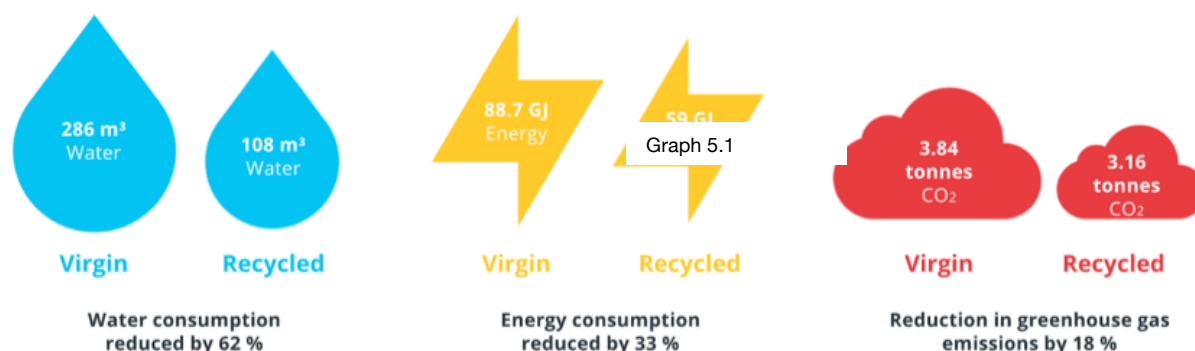
Repairing a garment can often be done quickly and inexpensively, and it has many benefits to the manufactures and brands. Each garment you repair and export, fetch you export value instead of scrap value and eliminates the added cost burden of having to discard that item. Also, manufacturers do not need to reproduce the shortfall to fulfil the customer order quantity. Typically brands allow +/- 3%

variation to the order quantity and any further shortfall than -3% would mean that manufacturers will need to reproduce those small quantities. Producing such small quantities is a nightmare for manufacturers as it takes up lot of time and effort whilst disrupting the entire flow of production. Furthermore, once manufacturers are confident of repair capabilities, having to use special markers to cut around defective fabric diminishes, thereby further reducing cutting wastage which is a key component of post-industrial fashion waste.

Repairing 3% of the defective garments in a small manufacturing facility could generate close to USD 1 million in bottom line savings annually. If a brand commits to repair 3% of the defective garments across its supplier base, the hard savings could be close to a billion USD. As per graph 1.1, there is total 25.6% waste in the form of defective fabric, defective garments and cutting residue and if at least 10% of this quantity can be repaired, then hard savings could be couple of billion dollars.

No of Factories -->	1	100	250	500	1,000
Repair 3% of factory output	USD 842,400	USD 84,240,000	USD 210,600,000	USD 421,200,000	USD 842,400,000
Reduce fabric order by 2%	USD 280,800	USD 28,080,000	USD 70,200,000	USD 140,400,000	USD 280,800,000
Reduce fabric quality by 10 cents/yard	USD 468,000	USD 46,800,000	USD 117,000,000	USD 234,000,000	USD 468,000,000
Total Hard Savings	USD 1,591,200	USD 159,120,000	USD 397,800,000	USD 795,600,000	USD 1,591,200,000
Benefits to the environment					
Waste Reduction (M.Tons)	12,636	1,263,600	3,159,000	6,318,000	12,636,000
Water Reduction (Gallons)	129,729,600	12,972,960,000	32,432,400,000	64,864,800,000	129,729,600,000
CO2 Reduction (M.Tons)	2,808	280,800	702,000	1,404,000	2,808,000

Unlike mechanical or chemical recycling, repairing doesn't consume more natural resources, nor generate more GHG emissions. Circle Economy performed a Life Cycle Assessment on one of the recycled yarns to assess the environmental impact savings associated with producing 100% recycled yarns. The analysis shows a decline of water, energy and GHG emissions. Whilst this is a significant achievement and step in the right direction, we must note that GHG emission only reduced by 18%.



Repairing a garment is far beneficial in comparison as it doesn't use any further natural resources nor generate GHG emissions. Policy makers, brands, manufacturers should look at repair as the first option before sending repairable garments for recycling.

Using repair services to reduce post-consumer fashion waste is in high demand among manufacturers but yet to be fully endorsed and supported by brands and often viewed as an inconvenient truth. Brands tend to ignore this vital circular business model, and no one speaks openly about it. This is a mindset that needs to change, but this is changing – and at a rapid pace – especially due to the regulations, particularly in the European Union and US, set to impact the entire fashion value chain in coming months and years.

New Policies in play

Fashion companies can't offset their way to net-zero, and actual reductions in emissions will need to happen to tackle climate change. Carbon offsets — or reductions or removal of emissions to compensate for those elsewhere — have come under increased scrutiny in recent years over whether these industry standards are actually effective in combating climate change. But most Countries are now coming up with new standards and policies that are more effective in driving circularity and achieving targets of the Paris Climate Agreement.

On February 23, 2022, the European Commission unveiled its draft directive on supply chain compliance requirements: the Corporate Sustainability Due Diligence Directive (CSDD). The draft was adopted by the European Council in December 2022. The next step will occur in May 2023, when the EU Parliament will reconcile various positions on the implementation of the regulation.

CSDD would require companies to document their social and environmental impacts and activities in their supply chains, determining any negative impacts on human rights and the environment that may exist within the companies' supply chains. Once these have been identified, companies must then take appropriate measures to correct them and publicly disclose these activities in a transparent way.

Sustainability comes with a cost

The Triple Bottom Line (TBL) is a concept that emphasizes the importance of a business's impact on social, environmental, and economic aspects. The term "Triple Bottom Line" was coined by John Elkington in his 1997 book "Cannibals with Forks: The Triple Bottom Line of 21st Century Business."

We believe that manufacturers will be the ones to drive transformation in the fashion industry as 95% of the emissions happen before the goods are shipped.

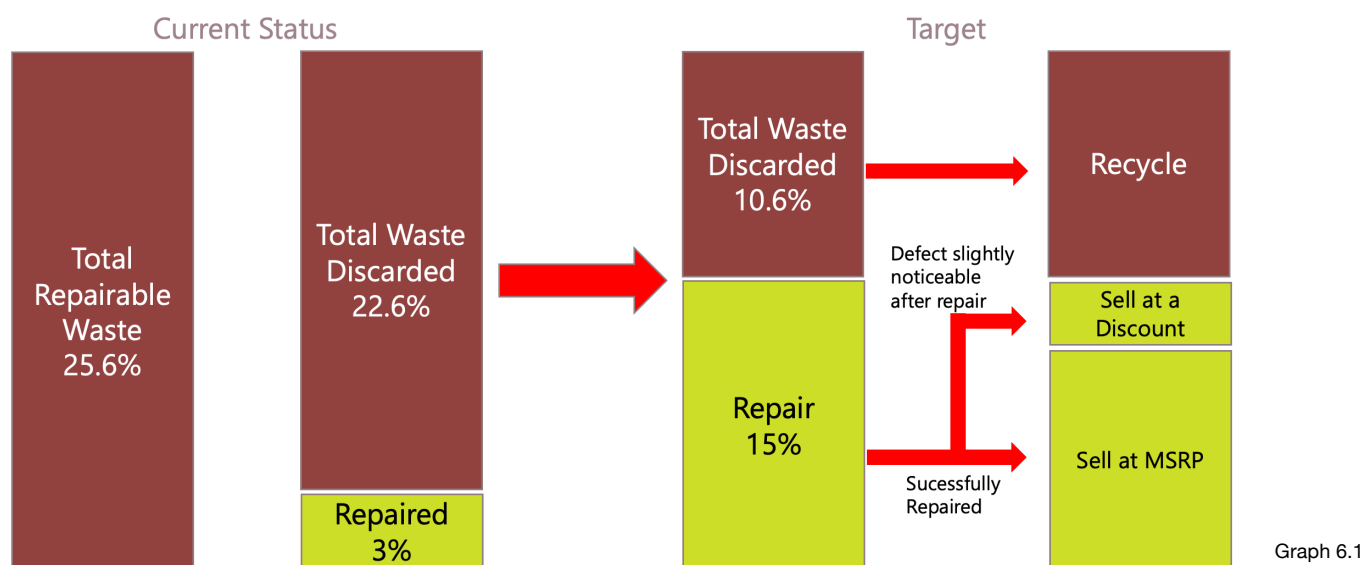
But although manufacturers must be the ones to drive the industry's change, they also cannot do it alone. Brands and policy makers must support. EU Corporate Sustainability Due Diligence Directive (CSDD) and Extended producer responsibility (EPR) are two great directives and will drive fashion companies towards achieving a triple bottom line.

Regulations is an important driver in defining future sustainability initiatives. Unless brands and retailers are preparing now to measure and evidence their outcomes with sustainability data, they may struggle to substantiate ESG claims or risk fines and a possible consumer backlash when progress cannot be suitably substantiated.

The fashion industry is facing a business-critical situation as they need to demonstrate progress in sustainability most likely as early as 2024. There are many tools, best-practices and circular business models currently in existence in textile manufacturing that brands can support and one such model is garment repairing which is simple, scalable, impactful and inexpensive and could most definitely help in reduce massive waste generated particularly in the global south.

Waste to wealth

If more shippable garments could be salvaged from over-produced and defective fabric and garments, and roll ends, totalling 25.6% of what is now considered waste as depicted on graph 6.1, brands and manufacturers can generate more revenue without making new clothes.



Brands could also incentivise manufacturers to turn every yard of fabric and semi-processed garment that is put aside in manufacturing into a finished garment. If such method is followed, a manufacturer will yield 5-15% more units than before. Any garments that could be successfully repaired could be shipped as A grade and sold at MSRP whilst any garments with noticeable minor defects could be sold at a

discount much like preloved garments that are sold through online channels these days.

Furthermore, If we could repair more garments, then burden on recycling will also be less. Brands ought to catalyse collaboration between manufacturers and providers of such repair services.

Waste isn't waste until we waste it

The author of this article, Ramesh De Silva, is the founder of Compreli and wearnrepair. Compreli is a pioneer in textile repair, restoration, and order fulfilment.



We believe the shift towards circularity needn't be complicated. Therefore we have designed a flexible step-by-step onboarding process that enables brands and manufacturers to join the circular economy. Our manufacturing partners especially benefit from an additional source of revenue, less disruptions to production process, increased sustainability credentials and the time to grow their business, safe in the knowledge that our processes are agile, ethical, sustainable.



To find out more about Compreli, please contact Ramesh De Silva on ramesh@compreli.com