

Circular Economy and the Fashion Industry

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Introduction

The fashion industry has a significant and harmful impact on the environment. This impact stems from its ranking as one of the most resource-intensive industries globally, causing damaging effects on the planet. Furthermore, the industry's fast-paced, trend-driven nature exacerbates the overproduction and overconsumption of clothing, resulting in serious environmental impacts throughout the entire value chain.

Overproduction is a significant problem, leading to unsold garments piling up in landfills alongside disposed of used clothing. Textile production and product transportation by air and ship contribute to high greenhouse gas emissions, further increasing the industry's carbon footprint. In addition, the process of dyeing and treating textiles requires an immense amount of water, putting a significant strain on freshwater resources. Despite being a sizable contributor to environmental harm, the fashion industry's exact negative impact is difficult to measure due to lack of consistent environmental performance measures or regulations. In regards to carbon emissions for example, a Harvard Business Review Article states, "This complexity and lack of transparency means estimates of the industry's carbon impact range from 4% (McKinsey and the Global Fashion Agenda) to 10% (U.N.) of overall global carbon emissions." (Pucker) Yet, without significant efforts towards sustainable production and consumption practices, the fashion industry's negative impact will continue to grow.

The article "Toward a circular economy: Understanding consumers' moral stance on corporations' and individuals' responsibilities in creating a circular fashion economy" claims that this mass environmental damage is a result of an industry that is "founded upon a wasteful economic system—the linear economy's 'take-make-use-throwaway' system" (Ki et al.). In this linear economic system, resources are extracted, transformed into products, used for a limited time and then discarded as waste at the end of their useful life. This model is characterized by a one-way flow of resources from extraction to disposal, with little emphasis on resource efficiency, waste reduction, or environmental impact.

Shifting towards a circular economy presents a viable alternative to this current linear system. The previously mentioned article states, "the circular economy's 'take-make-use-reuse' system is being touted by governments, business practitioners, and academic researchers as the key for replacing fashion's linear approach" (Ki et al.). In a circular economy, products are designed to be reused, repaired, refurbished or recycled, and waste is considered a valuable resource. The goal is to create a closed-loop system where resources are constantly regenerated and waste is minimized. This approach offers numerous benefits, including reduced environmental impact, increased resource efficiency and improved economic performance. With respect to the impact of this systematic shift, the article "Sustainable Design: Circular Economy in Fashion and Textiles" states, "Integrating a more circular economy as well as reducing waste and negative

environmental impact, will address the issue of depleting resources, as well as create new business growth opportunities and economies that are more competitive.” (Moorhouse and Moorhouse).

Circularity in the fashion industry is often perceived as a consumer-led movement. However, it is crucial for companies to take the initiative to start and lead these movements on their own. While consumers play a significant role in driving demand for sustainable and circular products, companies have the power to implement circular practices and offer sustainable options to consumers. Introducing circular business models within the fashion industry is still largely experimental and presents several challenges. Firms that have already adopted such practices can offer valuable insights and lessons learned that can inform and guide the industry towards a more sustainable and circular future.

The circular economy can be broken down into three principles: design out waste and pollution, keep products and materials in use and regenerate natural systems (Ellen Macarthur Foundation). This paper will examine industry case studies to provide an analysis of these three principles and their relation to the successes and barriers of implementing circular business models within the fashion industry.

Designing out Waste and Pollution

The fashion industry is one of the most wasteful and polluting industries globally. Globally, each year, about 30% of the garments produced remain unsold (Komazova 2022). The manufacturing processes of garments are water-intensive and are causing a lot of pollution. So it is imperative that brands need to adopt circularity and find ways to reduce their waste and recycle more.

Let us try and wrap our arms around this waste problem by classifying it into pre-consumer waste and post-consumer waste. Pre-consumer waste is the waste the industry produces while manufacturing garments; for example, the wastewater generated during the dyeing process or the fabric scraps produced during the garment production phase. Post-consumer waste is the waste generated after a garment is purchased, like discarded clothing or the microplastics shed during the washing process. The fashion industry predominantly generates wastewater and solid waste.

The fashion industry uses 79 trillion liters of water annually and contributes to about 20% of industrial wastewater (Milton and Astoul). The garment manufacturing process is very water-intensive. The amount of water used varies based on the fabric produced and the dyeing and bleaching process. Wastewater can be treated and reused by the textile industry only if it has similar properties to fresh water. Water used in the dyeing process rarely achieves this quality. (Sarker) Treatment plants to achieve such recycling goals are often high-tech and extremely expensive. Also, manufacturing units in locations where freshwater is abundant tend to not invest

in such technology. This technology also requires high amounts of electricity and is not viable in places where electricity costs are high.

Coming to solid waste, the fashion industry generates a lot of it in many different ways. From textile scraps to discarded clothing, this is a challenge that is keeping the industry on its toes. During the manufacturing process, fiber waste, lint, and scraps are generated. A lot of these are organic and decompose in the atmosphere. But, after a garment is discarded, it becomes challenging to recycle it due to the add-ons like buttons, zippers, linings, etc. If a garment is a combination of natural and synthetic fibers segregation becomes even more challenging. Statistics show that only about 13.6% of garments and shoes end up getting recycled, and only 1% of clothing gets recycled to make new clothing. (Beall) The remaining 12% is either used in insulation or as furniture stuffing. The garments that don't get recycled are either incinerated or dumped in a landfill. With such glaring gaps in the production and recycling processes, consumers are growing more eco-conscious, and brands are trying to get the needle to tip a little bit when it comes to garment waste management.

H&M, the Swedish fast-fashion brand, joined the Ellen MacArthur Foundation's Network in 2015 and announced its intention to become a circular business. Their circular business approach goes beyond looking at recycling alone. They also are looking into sourcing, treatment, and design of garments. In 2019, the brand released its 'Conscious' collection, which it claims is made from recycled and organic materials. They have taken some steps to close their value chain by 2030. (Shankar) They also had a goal to reduce water consumption by 25% by 2022 for individual suppliers' garments. (Shankar) In their flagship store in Stockholm, there's a recycling machine, Looop, that recycles garments in 8 steps. (Preuss) Finally, they also offer a repair and recycling program to encourage consumers to donate garments they no longer need and reward them with a 'thank you coupon'. They collected 29,000 tonnes of material for recycling via this program. (Shankar) It might seem like H&M is trying to make a difference and be more sustainable with all these initiatives, but there are certainly some gaps in their approach. H&M still produces large amounts of garments, which is the main culprit for waste generation. They reward consumers who donate clothes with coupons to encourage buying more clothes, which does nothing to change consumer shopping behaviors to adapt to a more circular approach. A major part of their recycled collection is made with plastics, which deteriorates the quality of the product. Their goal of reducing emissions per garment rather than overall emissions can affect their sustainability goals when there is growth in production levels. Also, in 2022, Quartz released an article about how H&M is botching up its numbers to make the brand seem more sustainable. This lack of transparency from brands is one of the key challenges to circularity and sustainability. As long as brands greenwash and release inaccurate data, it is difficult to predict how sustainable they are. It also makes the entire industry seem lacking, even though several brands are truly trying to make a difference.

Keep Products and Materials in Use

Another key principle of a circular economy is to "keep products and materials in use." This involves designing durable products, encouraging repair and reuse, and recycling and repurposing to maintain the flow of products and materials (Ellen MacArthur Foundation, 2017). If we look at the overarching goal of this principle, it is to really do three things: extend the lifespan of products, minimize waste, and maximize resource value. When we zoom in on the textile industry specifically, a majority of products end up in landfills. In 2017, the Environmental Protection Agency (EPA) reported that 16.9 million tons of textiles were produced in the United States, and 11.2 million tons were sent to landfills (EPA). But how can companies take a circular approach within the textile industry? Design garments made for disassembly and recycling, use recycled materials, and implement take-back programs. The following will include some real-industry examples and case studies related to the principle of "keep products and materials in use". But first, an acknowledgement to the preceding principle of "designing out waste and pollution", if companies don't appeal to that principle, it would be a challenge for them to hit a full circular economy and also implement the principle in this section. There will be some overlap between the sections regarding the use of sustainable materials but the key difference is the system of reusing and recycling the material.

The first company that we will be analyzing is the well known leader in the sustainability movement, Patagonia. When it comes to a circular economy, Patagonia has taken many measures to ensure that their products are built for durability and to stay out of landfills. First, Patagonia uses recycled materials in their products like recycled nylon, recycled down, and recycled polyester. In the mid 90's they started their streak towards innovation by partnering with TEIJIN who specializes in recycled materials which has driven their sustainability efforts. Second Patagonia has started multiple initiatives such as Worn Wear, launched in 2017, which is supposed to encourage people to repair, reuse, and recycle their Patagonia clothes instead of throwing them away. This program extends the product value, sells them at a lower price, and rewards people with a voucher for giving those clothes back instead of throwing them out. This contributes to the circular economy by repairing the old garments and reselling them again. Patagonia recognizes that a circular economy includes consumers, manufacturers, designers etc. for it to be truly effective and their methods try to do that. However, it's important to note that all materials are not created equal when comparing them to their environmental impact. We won't dive into every material that Patagonia uses, but, one of the examples they use for a circular economy is the transition they are making to recycled clothing - specifically the recycled polyester. Statistics report that generally it does take up less energy to be produced than virgin polyester, but it still releases microplastics and takes up more energy than hemp wool and cotton (MANTECO).

While Patagonia is working hard to make these initiatives successful, there are still barriers and

limitations. One of the main challenges is the lack of infrastructure and technology for recycling and repurposing textiles. For example, with garment recycling there is a challenge of cost with buying the machines and keeping them running. Another factor to consider is shipping costs of the garments to those facilities. Specifically for Patagonia, they noted that buying the recycled fiber usually costs about “20% to 30% more than virgin fiber” due to the market (Patagonia). Generally applied to the industry, this could increase barriers for companies with much less resources than Patagonia. Another challenge presented is in some of Patagonia’s materials, such as waterproof or windproof - there are no solutions yet for them to be recycled based on the fabric and film used on them. Right now, Patagonia stores them in a facility until they come up with a solution to treat them. Another factor is the ability to identify materials with labels - when it comes to recycling it's important to make sure the materials are sorted properly and when you are working with old gear and clothing it can be tedious to sort and also time consuming - resulting in additional costs and labor force (again challenging for smaller companies). Lastly, when we address the consumer perspective there is a balance that must be found between encouraging people to recycle their clothing because they need new ones, versus going to get new clothing because they can get a credit - thus not changing consumption/purchase rate of the clothing. Also, because of the lack of metrics and sustainability reporting, Patagonia had to create their own ways to measure their energy consumption and production processes so they could make the most informed decisions with their products. For Patagonia this has worked, but for companies with less resources it can be harder to make informed decisions about the best production methods or materials. Lastly, there must be a shift in the consumers' mindsets of durable clothing being a better investment than the trendy fast fashion that is in right now. Consumers can prioritize those low prices over sustainable durable clothing which can make it challenging for companies to prioritize these practices without losing customers.

Overall, when looking at the circular economy principle of "keeping products and materials in use" it involves designing durable products, encouraging repair and reuse, and recycling and repurposing to hopefully extend lifespan of products, the value, and minimize waste. With Patagonia, they use recycled materials and created initiatives like Worn Wear that encourage repair and reuse. However, barriers such as ambiguity in report, for recycling and repurposing textiles, the challenge of identifying and sorting materials, and consumer mindset shift towards durable clothing remain for Patagonia and for the industry at large.

Regenerate Natural Systems

The third principle of the circular economy is to ensure the regeneration of nature and its systems (Ellen MacArthur Foundation, 2017). To execute this principle, we need to relieve the stress on nature so that it may have room to breathe, regenerate, and thrive. The fashion industry is a heavy stressor on natural systems because it relies on other industries, such as agriculture, that already heavily stress natural systems while also generating outputs throughout their products’ life cycles that exacerbate these stressors. The production of textiles necessary to make clothing

alone requires the consumption of an extreme level of energy and water, and further tightens the chokehold on the environment through the output of GHGs, toxic aquatic pollutants, and degradation of soils (Shirvanimoghaddam et al. #). What approach can the fashion industry take to escape the destructive cycle while also meeting the needs and demands of the globe? The answer lies in further expanding the two former principles of the circular economy. The third principle requires that the Fashion industry must make the push to not only work within itself to create innovative sustainability strategies, such as keeping products and materials in use, but also expand beyond itself and promote practices within its extensive supply chain that regenerate the natural systems it draws from. This section will include a case study of a fashion industry brand that attempts to execute the principle to “regenerate natural systems.”

The global Japanese fast fashion retailer, UNIQLO, is a large multibillion dollar subsidiary brand under the holding company Fast Retailing Co. (FR). FR, and by extension its subsidiaries, states their mission as to provide “LifeWear” worldwide to people (FAST RETAILING CO., LTD.). According to FR, LifeWear is “clothing designed to make everyone’s life better” through the design and production of simple and accessible, yet high quality clothing (FAST RETAILING CO., LTD.). In Practice, UNIQLO achieves this goal through a strong network of producers and manufacturers around the world, allowing them to negotiate for low costs of a high volume of production and material acquisition, in turn allowing them to create “LifeWear” and all it encompasses (UNIQLO). This model on its own lends itself to the success of the company, but at a cost to the health of the environment. FR and UNIQLO understand this cost, and, as a result, have taken significant steps to mitigate and eventually reverse the damage their success causes. As a company, FR has positioned sustainability as a key value that guides the future of the company towards significant reforms to achieve sustainability (FAST RETAILING CO., LTD.).

Naturally, the third principle of the circular economy requires a bottom-up approach, and with sustainability as FR’s key value, the company was poised and ready to make significant reforms to the supply chain from the bottom-up. The company began this process at the procurement stage, seeking to improve the sustainability of their cotton supply by joining the Better Cotton Initiative (BCI) (“Sustainability Report 2021 Caring for the Environment”). The BCI focuses on creating a sustainable and stable supply chain of cotton to companies, by supporting and training farmers in sustainable agrochemical and water use to reduce the impact of cotton (Better Cotton Initiative). Further changes come in the production stage through zero discharge of hazardous chemical initiatives, reductions in water and energy use, and initiatives to tackle both microplastics and plastic waste (UNIQLO). Finally, UNIQLO has made efforts to improve retail locations that led to a reduction of 38.7% of GHGs in FY 2020, along with logistic efficiency, and ultimately the introduction of a clothing recycling program (RE.UNIQLO) that gets turned into new products, fuel, materials, or gets donated through partnerships with the UNHCR (UNIQLO).

The company's combined efforts are excellent examples of steps to reduce key stressors on the environment and allow the natural system to regenerate as per the third principle. However, it is difficult to determine whether the FR/UNIQLO have made a significant impact, enough to achieve the goals of circular fashion they say they hope to achieve. The lack of reporting on their supply chain data has and will continue to be a detriment to their mission, with nothing concrete to show they are ultimately greenwashing and attempting to create a green façade for the not-so-green fast fashion industry. There is much potential with the structure FR and UNIQLO report, yet are limited by their own lack of reporting. This is one of the biggest barriers for companies, and they build the barrier themselves.

Summary

In summary, in order to successfully implement a circular economy in the fashion industry and adopt circular business models at the brand level, it is imperative for companies to design out waste and pollution in their processes and keep products and materials in use, leading to the regeneration of natural systems. The fashion industry's current wasteful and polluting practices have a detrimental impact on the environment, and action is required to adopt sustainable practices and reduce its environmental footprint. While some brands are making efforts towards circularity and sustainability, such as recycling and waste reduction, challenges such as lack of transparency and greenwashing hinder meaningful change. Therefore, collaboration among brands, consumers, and other stakeholders is essential to drive positive change and create a more sustainable future for the fashion industry. Brands must prioritize transparency and accurate reporting to make a genuine impact on the industry's waste problem. They must address both pre-consumer and post-consumer waste concerns and find solutions to challenges such as scale, infrastructure, technology, and consumer mindset, as necessary steps towards embracing the principles of a circular economy. By taking a holistic approach and promoting regeneration throughout the entire supply chain, the fashion industry can work towards a more sustainable and circular future.

Works Cited

- Beall, Abigail. "Why clothes are so hard to recycle." *BBC*, 13 July 2020,
<https://www.bbc.com/future/article/20200710-why-clothes-are-so-hard-to-recycle>.
Accessed 6 April 2023.
- Better Cotton Initiative. "Retailer and Brand Membership - Better Cotton." *Better Cotton Initiative*, <https://bettercotton.org/membership/bcis-retailer-and-brand-membership/>.
- Ellen MacArthur Foundation. *A new textiles economy: Redesigning fashion's future*. 2017,
<http://www.ellenmacarthurfoundation.org/publications>.
- EPA. "Textiles: Material-Specific Data | US EPA." *Environmental Protection Agency*, 3
December 2022,
<https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/textiles-material-specific-data>. Accessed 5 April 2023.
- FAST RETAILING CO., LTD. "LifeWear." *FAST RETAILING CO., LTD.*,
<https://www.fastretailing.com/employment/en/uniqlo/graduate/gmp/lifewear/>.
- FAST RETAILING CO., LTD. "Sustainability Governance | FAST RETAILING CO., LTD." *Fast Retailing*, 30 November 2022,
<https://www.fastretailing.com/eng/sustainability/vision/organization.html>.
- "H&M Group- logo." *Ellen MacArthur Foundation*,
<https://ellenmacarthurfoundation.org/h-and-m-group>. Accessed 6 April 2023.
- Ki, Chung-Wha (Chloe), et al. "Toward a circular economy: Understanding consumers' moral stance on corporations' and individuals' responsibilities in creating a circular fashion

economy.” *Business Strategy and the Environment*, vol. 30, no. 2, 2020, pp. 1121-1135.
sci-hub.

Komazova, Iryna. “Fast Fashion is Destroying Our Planet: What You Can Do.” *World Cleanup Day*, 29 September 2022,
<https://www.worldcleanupday.org/post/fast-fashion-is-destroying-our-planet-what-you-can-do>. Accessed 6 April 2023.

MANTECO. “Is recycled polyester a sustainable choice?” *Manteco*,
<https://manteco.com/is-recycled-polyester-a-sustainable-choice/>. Accessed 5 April 2023.

Milton, Lena, and Eva Astoul. “Squeezing Us Dry: How the Fashion Industry Pollutes Water — Sustainably Chic.” *Sustainably Chic*, 3 January 2023,
<https://www.sustainably-chic.com/blog/how-the-fashion-industry-pollutes-water>.
Accessed 6 April 2023.

Moorhouse, Debbie, and Danielle Moorhouse. “Sustainable Design: Circular Economy in Fashion and Textiles.” *The Design Journal*, vol. 20, 2017.

Patagonia. “Closing the Loop - A Report on Patagonia's Common Threads Garment Recycling Program.” *Patagonia*,
<https://www.patagonia.com/stories/closing-the-loop-a-report-on-patagonias-common-threads-garment-recycling-program/story-19961.html>. Accessed 5 April 2023.

Patagonia. “Recycled Polyester.” *Patagonia*,
<https://www.patagonia.com/our-footprint/recycled-polyester.html>. Accessed 5 April 2023.

Preuss, Simone. “How effective are H&M's circularity efforts?” *FashionUnited*, 19 February 2021,

- <https://fashionunited.com/news/business/how-effective-are-h-m-s-circularity-efforts/2021021938213>. Accessed 6 April 2023.
- Pucker, Kenneth P. "The Myth of Sustainable Fashion." *Harvard Business Review*, 13 January 2022, <https://hbr.org/2022/01/the-myth-of-sustainable-fashion>. Accessed 5 April 2023.
- Sarker, Sumit K. "Wastewater Recycling in Textile Industries." *Earth.Org*, 12 May 2022, <https://earth.org/wastewater-recycling-in-textile-industries/>. Accessed 6 April 2023.
- Shankar, Ved. "How Is H&M Bringing the Circular Economy to the Apparel Industry?" *The Strategy Story*, 15 November 2020, <https://thestrategystory.com/2020/11/15/hnm-apparel-industry-circular-economy/>. Accessed 6 April 2023.
- Shirvanimoghaddam, Kamyar, et al. "Death by waste: Fashion and textile circular economy case." *Science of The Total Environment*, vol. 718, no. 137317, 2020, pp. 1 - 10. *ScienceDirect*, <https://www.sciencedirect.com/science/article/abs/pii/S0048969720308275>.
- UNIQLO. "RE.UNIQLO : A New Life for UNIQLO Clothing." *Uniqlo*, https://www.uniqlo.com/jp/en/contents/sustainability/planet/clothes_recycling/re-uniqlo/.
- UNIQLO. "Sustainability Report 2021 Caring for the Environment." *Uniqlo*, <https://www.uniqlo.com/jp/en/contents/sustainability/report/2021/planet/>.
- UNIQLO. "UNIQLO Business Model." *FAST RETAILING CO., LTD.*, <https://www.fastretailing.com/eng/group/strategy/uniqlobusiness.html>.
- Wijngaarden, Melissa. "H&M's Circular Design Story Collection & Greenwashing: the good, the bad and the ugly | Sustainable Fashion News." *Project Cece*, 9 December 2021,

<https://www.projectcece.com/blog/466/hm-circular-design-story-greenwashing-or-sustainable/>. Accessed 6 April 2023.