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Adopting Circular Practices Across the Fashion Industry: The Circular Model

Maja Gjureska

Abstract

The fashion industry is one of the biggest polluters on the planet. New technologies, fast production, and increased demand result in massive carbon emissions, high water consumption, and pollution of water bodies, as well as microplastic waste that ends up in the oceans. The circular model represents an analysis of the issues across all stages of the fashion industry and is a synthesis of solutions and practices that can contribute to environmental protection. Achieving sustainability in all phases of the production-consumption processes means that the responsibility for protecting the environment is a shared responsibility among all participants in the fashion industry. This paper concludes the goals and content of the initiatives and practices promoted through #NoWasteMK, 2021 MFA, and Skopje Fashion Weekend.

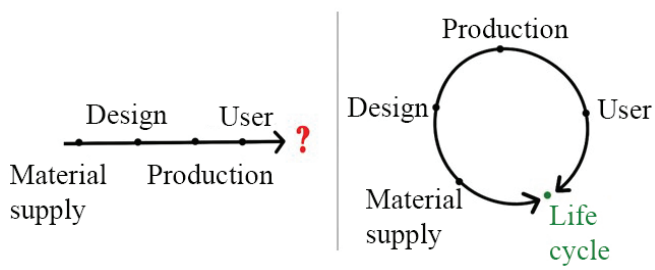
Keywords: Sustainability, Circular, Textile, Industry, Fashion

Introduction

The circular model is based on the principle that everything created in nature ends up in nature and vice versa. The goal of the circular model is to achieve the ultimate sustainability of products. Achieving ultimate sustainability in all phases of the production-consumption processes means that the goals of production and usage are directed toward environmental protection. These goals apply to all participants in the circular model. In this sense, the focus of the circular model undoubtedly refers to practices related to the origin and lifecycle of materials and products as a significant factor that transforms the traditional production system from a linear to a circular model (Figure 1).

Figure 1

Linear Model | Circular Model



Various examples from the practical implementation of the circular model highlight a series of challenges faced by participants in these processes. These challenges are the result of the impacts of contemporary textile production practices on the environment:

- Use of large amounts of water in the production processes
- Release of microplastic fibers into nature that may end up in the food chain
- Carbon emissions
- Textile waste

Research Methodology

This study uses a combination of **qualitative**, **quantitative**, and **direct** research methodologies to explore sustainability in the fashion industry, focusing on the

implementation of circular economy principles. These methods were selected to ensure a comprehensive analysis of both the conceptual and practical aspects of sustainable fashion.

Qualitative Research

The qualitative aspect of this research involves collecting **subjective** data through **interviews** and **focus group discussions**. This includes engaging with fashion industry professionals such as designers, manufacturers, and consumers. The qualitative data was gathered from industry events, roundtables, and panel discussions, particularly focusing on the *Circular Fashion and Textiles* roundtable organized by #NoWasteMK, 2021 MFA, and Skopje Fashion Weekend. The aim was to understand personal experiences, opinions, and insights about the challenges, barriers, and opportunities surrounding the transition to a circular economy in the fashion sector.

Direct Research (Primary Data Collection)

Direct research was conducted through **participant observation** at industry events and conferences, as well as **direct interaction** with key stakeholders involved in sustainable fashion. Observation of panel discussions and presentations during the event allowed the researcher to gain firsthand insights into the current practices, challenges, and innovations in circular fashion. Additionally, interviews with key participants provided a direct understanding of the practical implications and real-world experiences regarding circularity in fashion design, manufacturing, and distribution.

Data Analysis and Synthesis

The data collected through qualitative, quantitative, and direct research methods were analyzed using both **descriptive** and **inferential** techniques. The analysis includes categorizing and coding responses from interviews, surveys, and observations. The synthesis process brings together these diverse sources of information to identify patterns, trends, and correlations, which will provide a deeper understanding of the integration of circular economy principles in the fashion industry. This methodology allows for the development of actionable recommendations for advancing sustainability in the sector.

Basic Concept

The life cycle of products begins in the design planning phase and continues through several key stages: sourcing (materials and raw materials), production, distribution, use, and renewal. The main goal is to ensure sustainability and minimize the environmental impact by managing resources at each of these stages.

- **Sourcing - Materials and Raw Materials:** The initial phase in the product life cycle is the selection of materials to be used for production. To achieve circularity, it is necessary to use materials that are biodegradable or easily recyclable.
- **Production - Processes for Producing Materials and Products:** This phase involves the efficient use of materials and minimizing waste through technological innovations. The processes should be adapted to facilitate the easy recycling or reuse of materials once the product's life cycle has ended.
- **Distribution - Delivering Products to Consumers:** In this phase, it is important to use packaging that is recyclable or to reduce transportation waste, as well as apply the principle of local distribution to minimize emissions.
- **Use - Consumer Use of the Product:** Furthermore, it is essential to ensure that products are durable, easy to maintain, and that they can be used in a way that minimizes their negative environmental impact.
- **Renewal - Redirecting Used Materials Back to Sources:** This is the most critical phase in the circular economy. The key question is how to redirect materials from used products back to sources (recycling, reuse, or composting). An example of this is creating closed loops for materials, where waste or used products are not discarded but redirected back into the production process.

To achieve sustainability of products and materials, the following factors must be considered:

- **Biodegradability:** Materials and products must be biodegradable so they can easily return to nature without disrupting the ecosystem.
- **Recycling:** Materials and products should be designed to be recyclable or reusable, reducing the amount of waste that ends up in landfills.

The concept of the circular economy focuses on maximizing resource use and minimizing waste, with the goal of ensuring long-term sustainability of products and reducing their environmental impact.

Discussion

Everything that is created has an expiration date or a lifespan. The life cycle of a product begins in the design planning phase. Subsequently, the life cycle of products passes through several distinct stages (see Figure 2): sourcing – materials and raw materials, production – processes of producing materials and products, distribution – delivering products to consumers, usage – the use of the product, and renewal – redirecting used material back to the source. A key question that concerns both participants in production and consumers regarding the product life cycle is: How can materials from used products be redirected back to the source? There are several different practices for achieving sustainability of materials and products, based on the following factors: Are the materials/products biodegradable? Can the materials/products be recycled?

The fashion industry is one of the largest polluters in the world, contributing significantly to environmental degradation through excessive water use, toxic dyeing processes, and high levels of waste. Fast fashion, in particular, exacerbates this problem by encouraging overproduction, overconsumption, and the disposal of garments after only a few uses. The Companies will only be held truly accountable for unethical practices, such as child labour, forced labour, and the sourcing of materials, if they are legally required to disclose such information. In other words, binding laws are necessary to ensure transparency and responsibility in business practices.

"For these practices to be effective, they must be developed such that responsibility falls on every actor across the supply chain, as large organisations have often been able to shed responsibilities by claiming unawareness." (Charter et al., 2023, p. 71)

Textile Materials in the Industry

Textile materials play a crucial role in the fashion industry, influencing both the aesthetics and functionality of garments. They can be broadly categorized into natural fibres, such as cotton and wool, and synthetic fibres, like polyester and nylon. The choice of material affects the garment's sustainability, with natural fibres often seen as more eco-friendly due to their biodegradability, while synthetic fibres can contribute to environmental issues like microplastic pollution.

Synthetic fibres are often viewed as harmful, while natural fibres are considered more eco-friendly. This judgment is shaped by a mix of factors, such as the

renewability of raw materials, biodegradability, and negative stereotypes linking synthetic fibres to chemicals, factories, and pollution. The global demand for textile fibres is on the rise, with polyester seeing a significant surge in production. In fact, polyester's production has doubled in the past 15 years, surpassing cotton to become the most widely produced textile material (Fletcher, 2013, p.12).

Table 1

World fibre production in 2010 (Million tons)

(Fletcher, 2013, p. 12, Chart 1.1.)

Table 1.1 *World fibre production in 2010 (Million tons)*[3]

	World fibre production
Natural fibres	
Cotton	25.10
Wool	1.12
Silk	0.14
Total	26.36
Manufactured fibres	
Cellulosics	3.24
Synthetics	
Polyester	36.46
Nylon	3.86
Acrylic	1.98
Others	0.71
Total synthetics	*43.01*
Total	46.25
TOTAL	**72.61**

Biodegradable Materials and Products – Natural materials such as cotton, linen, hemp, bamboo, etc., are materials that are inherently biodegradable. For example, if cotton is pure (100% cotton), it decomposes within a period of one week to five months. Linen, silk, and hemp are materials that decompose quickly. Wool and other natural fibres also biodegrade, but at a slightly slower rate compared to the previously mentioned materials.

In the context of the circular economy, it is critical to focus on materials that can be reused or returned to nature without causing long-term harm to the environment. Through responsible selection of materials in the design and production processes,

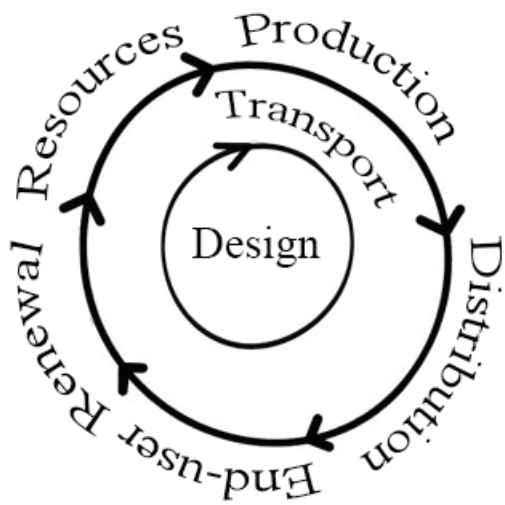
manufacturers can significantly reduce the environmental impact of their products over their entire life cycle. Additionally, these biodegradable materials can be part of a broader strategy for reducing textile waste and preventing harmful pollutants from entering natural ecosystems.

In parallel, it is essential to consider the recycling potential of materials used in production, as the ability to recycle products plays an important role in the circular economy. The transition from linear to circular production models requires rethinking material flows and waste management strategies to promote a more sustainable, closed-loop system.

By addressing these issues, it becomes evident that the circular economy does not only focus on the sustainability of the final product but also the processes and materials that support its creation, use, and disposal

Figure 2

Phases of the Product Life Cycle



Bamboo takes between one to five years to decompose, and the decomposition of materials is faster when they are in pure rather than mixed compositions.

Recycling – Recycling fabric generally means that the textile is returned to the form of fibre, from which yarn can later be created. The recycling process differs for natural and synthetic materials. Natural materials are processed into fibres, which

are then spun into yarn. The yarns can then be woven, knitted, or compressed depending on the end use. Textiles are sorted by colour before the recycling process begins, as materials that do not need dyeing save energy and do not pollute the environment. The end result of fabric recycling is of lower quality than the original, and the fabric has a coarser texture due to the shortening of fibres during the recycling process. Synthetic fibres, on the other hand, are broken down into granules to be turned into plastic pellets. These pellets are then melted and spun into new yarn, which is later woven or knitted into new fabrics. Recycling materials made from mixed compositions is a more complex process because the recycling processes for natural and synthetic fibres differ.

A large number of materials used today are made from mixed compositions, and their redirection back to the source is a complex process. Of course, there are practices for caring for and renewing products, through which their lifespan can be extended.

Raw Materials and Materials

Textile materials, depending on their origin and production methods, have their advantages and disadvantages in terms of how beneficial or harmful they are to the environment and to humans. In this regard, awareness of the materials, their origin, production process, and properties is essential in the material selection process to create sustainable products. Materials that are believed to be increasingly used in the textile industry in the future include materials such as lyocell, hemp, and bamboo, mainly due to their production processes, which are characterized by fast growth, water conservation, and being free from chemicals, pesticides, and waste. Additionally, these materials are of natural origin, meaning they decompose naturally in a relatively short period of time.

Within the framework of #NoWasteMK, an experimental project was presented involving biodegradable tights dyed with eco-dye from grape skin, in partnership with the brand Bio 422 and the "GenLight" laboratory. Bio 422 - the world's first biodegradable tights with Aloe Vera. Combining Amni Soul Ecotechnology, premium Aloe Vera formula, and a team of experts, they created a new and innovative product – biodegradable tights that decompose in 3-5 years and turn into biomass. This technology reduces ecological footprints and greenhouse gases by reusing water in the production process. Using materials that do not harm the environment, they correspond to the final stage of the product's biodegradation cycle and leave no waste.

Although the actual circumstances for designers are not always conducive to using fully sustainable materials, one way to address this issue is by establishing a balance in the application of materials used in fashion collections. In order to ease the selection process and encourage maximum sustainability, designers think in the following directions:

- **Placement** – What materials are available at the moment?
- **Origin and composition of materials** – How are the materials produced?
- **Impact** – What is the environmental impact of the materials?
- **Selection** – Which resources are more environmentally friendly than others?
- **Lifecycle** – How can sustainability be achieved for the materials after their use?
- **Alternative solutions** – Are there alternative solutions in the material selection process (use of textile waste; use of bio-waste; use of recycled materials)?

In the material selection process, the designer makes decisions regarding the materials and the composition of other product elements such as fastening mechanisms (buttons, zippers, rivets, passport straps, etc.) or informational labels. When selecting and making these decisions, the designer thinks about: the origin of the materials of the elements, the way they are assembled, and how quickly and easily they can be separated from the products after use.

Guidelines for Achieving Sustainability in the Circular Model for all Participants

In the context of creating sustainability within the circular model, all participants should prioritize sourcing materials based on their origin, ensuring that production processes minimize environmental impact. This includes using recycled materials or those with high recyclability, opting for biodegradable or eco-friendly/organic certified materials, and choosing naturally derived resources that align with Cradle to Cradle principles. Waste should be maximized through repurposing, redesigning, and utilizing efficient techniques for processing and refining raw materials that do not harm the environment. Additionally, leveraging local products and services fosters a more sustainable and resilient supply chain. The key aspects for achieving sustainability are as follows:

Origin and production of materials: Prioritize sourcing materials with low environmental impact and support sustainable production practices that reduce carbon footprints.

Use of recycled materials or materials that can be recycled: Incorporate materials that are either made from recycled content or can be easily recycled at the end of their lifecycle.

Use of biodegradable materials: Select materials that naturally break down without harming ecosystems, contributing to reducing waste and pollution.

Use of eco-friendly/organic certified materials: Select materials that are certified organic or eco-friendly to ensure they are produced with minimal environmental harm and without toxic chemicals.

Use of naturally derived materials (C2C – Cradle to Cradle): Choose materials that are renewable and designed for reuse or recycling, following Cradle to Cradle principles to promote a circular economy.

Maximized utilization, repurposing, and redesign of waste: Focus on reducing waste by finding innovative ways to repurpose materials or redesign products for longer life cycles.

Use of processing and refining techniques for raw materials and materials that are not harmful to the environment: Employ eco-friendly methods for processing raw materials that avoid harmful chemicals and minimize energy consumption.

Using local products and services: Support local economies and reduce environmental impact by sourcing products and services from nearby suppliers to lower transportation emissions.

Design

Design is a preliminary activity that involves problem-solving and innovation. Fashion designers today deal with a wide range of issues and themes in their design processes, and fashion itself is much more than just utilitarian. These conceptual approaches give designers the opportunity to create and add value through the lens of products. In addition to products, designers also deliver services. In the process of creating sustainable design, services play an important role, both in that they represent a circular practice in themselves and in communicating and nurturing the values that are built.

When it comes to environmental preservation and the collective good, designers have the power to choose through the product design process. Understanding and complying with sustainability practices the designers need to **endeavour** the changes and the transition from linear to circular model of production as part of the fashion industry.

linear production creating sustainable products means detailed and systematic planning of the production-to-consumer processes. Within the circular model, the designer strives to achieve:

- Sustainable Design
- Renewable Design
- Long-term Design
- Biodegradable Design
- Innovative Design
- Value-added Design
- Design that Keeps Up with New Technological and Technological Trends

Even in the design planning phase, the designer addresses questions related to users, their living habits, needs, and desires. Communication processes can contribute to informing the user about materials and products, how to maintain and care for them, as well as the methods through which long-term use of the products can be achieved. In this early phase, the designer also defines the product's lifecycle and provides an explanation of what happens to the product once its function is finished. In this phase, the designer considers delivering services that will help users participate in the circular system. These services include:

- Services for product correction and maintenance to extend the product's lifespan.
- Services for repurposing or redesigning products.
- Rental services for products.
- Services through which users can return products after use in exchange for new ones.
- Recycling services for materials.

Nowadays, designers and brands provide customers with extra materials, like additional fabric and matching thread, along with detailed instructions. This practice encourages consumers to take better care of their garments (Gwilt, 2020, p. 133).

Within the framework of #NoWasteMK, fashion designer Mirjana Josifoska debuted with her independent hat collection "The Seven," which consciously relativizes the standard conventions of conscious fashion. Each piece in the collection is made from textile waste from workshops in our country. Most of the hats come with removable straps. Once the straps are removed from the hat, they can be joined together and used as a scarf. The straps are designed in various colours and fabrics. The designer also practices a "Return Policy": when a customer no longer wants to wear the hat and plans to throw it away, they return it to the designer and receive a discount on the next order. The returned hat is recycled and reused by the designer as much as possible, creating a new hat from it. This further supports the circular economy. The collection EUNOIA, presented by LUNΛ ADITEYΛ, features 11 variations of the classic white shirt. It is a multifunctional piece – a piece that can be worn at meetings or on walks in nature, changing its appearance with a few simple adjustments, such as removing the sleeves or opening the shirt, which discreetly reveals the skin. The business piece transitions into a comfortable piece that can be styled for any occasion. Details are the focus. The buttons are custom-made by the designer and her collaborators using 3D printing and a special technique with epoxy resin combined with natural flowers.

Production

Textile industry practices are responsible for approximately 20% of global pollution. The negative environmental impacts are observed through: excessive water use, the release of microplastics that can end up in the food chain, 10% of global carbon emissions, and textile waste (mainly due to inadequate technology – less than 1% of clothing is recycled globally). Production is driven by demand, and vice versa. Modern practices regarding production and distribution are based on fast fashion trends, which are characterized by hyper-production of clothing and accessories. The quality of products within fast fashion has decreased, resulting in clothing having a short lifespan and ultimately ending up as waste after use. Another type of waste present in textile practices is the textile waste left after production. The use of local sources for the procurement of materials and raw materials is crucial in all phases of the circular model, as this would reduce carbon emissions resulting from air and water transport.

"The logic of economics driven globalized production and distribution is at the core of unsustainability, for the larger scale and innate anonymity of globalized

fashion system perpetuates inability to understand its social and ecological impact." (Fletcher, 2008, p. 89)

Implementing circular model practices in the production processes would mean:

- Reducing hyper-production of clothing and fashion accessories.
- Quality/quantity – creating products that are of high quality and have a longer lifespan, maximizing the utilization of consumables and reducing waste from production processes – potential for new products or businesses.
- Using sustainable, efficient, and renewable materials and processes.
- Recycling or using recycled materials.
- Employing environmentally friendly technologies and production methods.
- Local sources – local production.
- Directing B2B and B2C relationships toward finding new solutions for achieving sustainability.

The continuous search for new solutions to reduce the harmful impacts of textile industry practices and the implementation of effective practices is crucial for all participants in the circular model. For example, the jewellery collection by Maja Stojkovska, made from electronic waste, serves as an alternative solution for using materials and processes that are sustainable, efficient, and renewable. Current trends in the design and production of electronic devices artificially encourage their quick replacement, which has resulted in electronic waste exceeding 50 million tons in 2020. The collection is 99% electronic waste, aluminum coolers from computers, and computer cables, while adhering to the "zero waste" concept, meaning minimal waste is produced during the creation of each unique piece.

Sales

The circular model is increasingly relevant in the sales processes of fast fashion. For example, the fashion brand ZARA (part of the Inditex group – one of the largest global retail chains that includes eight fashion brands) has begun to shift its practices toward sustainability after 50 years of participating in the fast fashion system, introducing sustainability services and aiming to use 100% sustainable materials by the end of 2025. Others, like Marks & Spencer, collaborate with NGOs (in this case, Oxfam) and offer customers a service where worn-out clothing is returned to the organization, and customers receive a discount at M&S. However,

in most cases, there is no clear system, direction, or service through which users can achieve sustainability of materials and products after their use, and practices are needed to address this issue. Communication processes through sales channels are critical to achieving sustainability. Through these channels, users are informed about ways to maintain, care for, and extend the lifespan of products, as well as the value context of the brand and the concept it is built upon.

Furthermore, building a transparent supply chain can be challenging, even though there are organizations and networks that support finding reliable partners. While it's feasible to collect information on a small, local scale, the task becomes much more complicated when applied to large-scale fashion manufacturing. However, there are now several companies and initiatives that use advanced technologies to monitor and track the movement of goods throughout the supply chain (Gwilt, 2020, p.98).

Services are key in the sales processes because they provide users with the opportunity to achieve sustainability during and after the use of products.

Placement of Sustainable and Renewable Products

- Services for product correction and repurposing – services that help end users maintain and use products longer.
- Offering rental services for products.
- Services for pre-use and/or redesign of products.
- Use of sustainable materials for labelling and packaging products.
- Recycling services for materials from worn-out products.
- Communicating the marketing concept of circularity and sustainability to users.

User

Living ecologically and sustainably, within the possibilities, is the responsibility of every individual. An increasing number of consumers are concerned about the environment by using sustainable resources. However, achieving sustainability is not an individual responsibility, but a collective one, and it applies to all participants in the production-consumer processes.

"The consumer lifestyle that industrial society has developed as general model is in crisis: the planet is not big enough to sustain a world of 6 billion people at today's level of compulsion." (Brower, et al., 2005, p.52)

One way to address the issue of achieving sustainability is by exercising the right to be informed about the origin of raw materials and materials, as well as the way in which products are made. Knowledge about materials and production processes can assist in the decision-making process when it comes to purchasing. The consumer undoubtedly reaches a point where they need to decide what will happen to products after their use. There are several ways in which clothing can be maintained and cared for to ensure a longer lifespan. Using services for correction, repurposing, or redesigning clothes is just one of the ways to extend the life of products. There are numerous platforms or ways through which clothing exchange, donation, or second-hand purchasing takes place. The trend of clothing rental is becoming increasingly common. All these examples aim to reduce the hyper-demand for cheap, low-quality products, thus transforming the hyper-production of fast fashion into sustainable production. The product life cycle can be renewed if products are recycled or if biodegradable products are used. Buying locally is important as it helps reduce carbon emissions generated during the transportation of materials and products.

Consumer

Consumers can significantly contribute to sustainable practices in fashion by making conscious choices that promote environmental and social responsibility. Here are some key ways they can help:

- Gets informed about the origin of raw materials, materials, and production processes
- Takes long-term care of the product's lifespan
- Uses services for correction and repurposing of products
- Rents, reuses, or uses services for redesigning clothes
- Avoids buying more than necessary, thus not supporting the hyper-production of clothing
- Uses biodegradable products
- Recycles
- Buys locally

Conclusion

In conclusion, sustainability in the fashion industry is not only a responsibility but a necessity for all participants—from designers and manufacturers to retailers and consumers. By embracing sustainable practices, the industry can mitigate its environmental footprint, reduce waste, and address key issues such as overproduction and unethical labor practices. Manufacturers can innovate with eco-friendly materials and circular production models, while retailers can promote conscious consumption. Consumers, in turn, can drive demand for more sustainable products. If every participant plays their part, the fashion industry can evolve into a more sustainable, ethical, and responsible sector, ensuring long-term viability for both the planet and its people.

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