



Pioneering a future textiles economy using circular economy principles and practices: an entrepreneur's guide

Adam Outcelt
Javier Carrillo-Hermosilla

Pioneering a future textiles economy using circular economy principles and practices: an entrepreneur's guide*

ABSTRACT

This work serves as an explanation of and an investigation into the current textiles economy and highlights how circular economic strategies can be implemented within the industry in order to not only mitigate negative externalities of mass garment production, but actually transform the textile supply chain into one that provides environmental, social and economic value. By explaining business principles from a historical perspective and then delving into the conceptual framework behind the Circular Economy, clear potential benefits can be outlined when circular strategies and principles are applied to textiles. An investigation into five European businesses within the garment value chain that are already prioritizing circular practices using varied and combined business models allows an entrepreneurial guide to be created that offers instruction on how to make internal changes towards activity that is truly green, community-enriching, and profitable to existing companies and entrepreneurs looking to start their own business within the industry. This alignment of Circular Economy principles and textiles is explained not as a burden to businesses, but rather as an opportunity to reap economic benefits and focus on sustainable practices as they become more and more demanded by consumers and governmental bodies across the globe.

Key words: Circular Economy, Textiles, Sustainable Development, Transparency, Traceability, Fast Fashion

RESUMEN

Resumen:

Este trabajo se basa en la investigación de la industria textil actual y explica cómo ciertas estrategias circulares pueden ser implementadas dentro de la misma, para no tan solo mitigar el impacto negativo de la producción textil en masa, pero también aportar valor añadido a la cadena de suministro en cuanto al medio ambiente, la sociedad, y la economía. Después de exponer las tendencias de negocio desde la perspectiva histórica e indagar en el marco conceptual de la economía circular, se destacan unas claras ventajas respecto a la aplicación de estrategias circulares a la industria textil. El estudio de cinco negocios textiles europeos que ya priorizan prácticas circulares permite la creación de una guía empresarial que ofrece instrucciones de cómo hacer cambios internos hacia un negocio más sostenible, más exitoso financieramente, y uno que enriquece a la comunidad; dirigido tanto a compañías que ya existen como a nuevos emprendedores de la industria textil. Esta implementación de los principios de la economía circular en el mundo textil se convierte, no en una carga adicional para el negocio, sino en una oportunidad de generar mayores beneficios económicos y de enfocarse en las cada vez más demandadas prácticas sostenibles tanto por parte del consumidor como por las agencias reguladoras del sector.

Palabras clave: Economía Circular, Productos Textiles, Desarrollo Sostenible, Transparencia, Trazabilidad, Fast Fashion

AUTOR

ADAM OUTCELT finalizó sus estudios en gestión de empresas en la Universidad de Wisconsin-Madison en el 2016 y prosiguió su carrera cursando el Máster en Management y Gestión del Cambio por la Universidad de Alcalá. Fue durante estos dos años cuando empezó a interesarse por la economía circular, gracias a su profesor y tutor Javier Carrillo-Hermosilla, y por ello decidió utilizar este tema, enfocado a la industria textil, para su Trabajo del Fin de Máster, que defendió en el 2021. Este trabajo recibió el premio al mejor Trabajo de Fin de Máster en materia de emprendimiento e innovación por la escuela de Emprendimiento de la Universidad de Alcalá. Actualmente se encuentra en Estados Unidos, donde está complementando su formación en el sector por cuenta propia para acceder al mercado laboral y poder aplicar sus conocimientos adquiridos en modelos de negocio que utilizan la economía circular.

*This document originates from the master's thesis presented by Adam Outcelt under the guidance of Javier Carrillo-Hermosilla for the Máster Universitario en Management y Gestión del Cambio program.

ÍNDEX

1. Introduction	5
2. Conceptualization.....	6
2.1. Modern Business – Historical Perspective and Framework	6
2.2. The Circular Economy.....	14
2.3. The Modern Textile Industry.....	23
3. Methodology.....	35
4. Case Studies	36
4.1. Case #1 – Circular Supply Chain: Ecoalf	37
4.2. Case #2 – Recovery and Recycling: I:CO	41
4.3. Case #3 – Product Life Extension: Nudie Jeans	45
4.4. Case #4 – Sharing Platform: Circos	49
4.5. Case #5 – Product as a Service: Dutch Awearness	53
5. The Entrepreneur’s Guide to Circular Textiles	57
6. Conclusions.....	69
7. Bibliography	71

1. Introduction

Over the course of human history, societies and economies have undergone immense change, often hand-in-hand with the technological advances that change the way people communicate, interact and exchange goods. Within the last century or two, these societal and economic aspects of the world have been complemented with an environmental component as science has allowed humans to realize and measure the impact their actions have had on the overall well-being of the planet. Since the industrial revolution, organized human activity in the form of business has created a mountain of wealth in the developed world while also contributing greatly to complex issues that plague our environment, society, and economy: climate change, pollution, inequality, and poverty (CGC, 2019).

The overarching purpose of business in regards to its three dimensions (environment, society, economy) has been argued to be many different things, from having one, sole purpose of maximizing profit for the owners (Friedman, 1970) to making a healthy profit so that that money can be applied to a certain environmental or societal issue in a way that gives that business a purpose or a reason to exist (Handy, 2002).

In recent years, however, new types of businesses have emerged that challenge the traditional ideas surrounding the purpose of a business. As citizens and leaders become more informed and aware of the impact their business activities have on their environment and the people within their communities, there is mounting pressure for new and existing organizations to be more than just money-generating machines.

While these modern organizations take on many different names, one thing they seem to have in common is their ability to incorporate an overarching purpose or goal, usually in environmental or social terms, directly into their business models. By instilling core values and identifying with a cause from the very beginning, these companies let their purpose guide them on their journey towards long-term economic value generation. By no means is such a systemic change something that happens overnight, but rather a gradual process driven by technological advances and changing consumer behavior.

The first part of this paper looks into the core principles of business of the last generations and how focusing on maximizing short-term profit margins can have negative effects on all three dimensions of business, albeit most notably on the environmental dimension. The conceptual framework behind the Circular Economy (CE), including newer, purpose-driven business and their own principles, is then presented and explored as a solution to many of the negative aspects of traditional business, where resources are exploited for short-term gains and long-term impacts are often overlooked. The rifts between the three sectors in the current business system (public, private, non-profit) are identified as a key barrier to coordinating

value-generating efforts in the long-term, and the present and future political facilitation of a large-scale CE is introduced as an enabler of new economic terrain that encourages cooperation towards common goals in all three dimensions of business. Furthermore, an in-depth look at key CE strategies and business models investigates how the implementation of a circular business practices can serve as a catalyst in the mainstream adoption of social and environmental purpose for entrepreneurs and private business entities. This purpose, coupled with immense economic benefits, would allow the private sector to drive real, meaningful change within their communities across the world (Ellen MacArthur Foundation, 2014).

The second part of this paper dives deep into the modern-day textile industry, which is regarded as one of the most wasteful and polluting industries on the planet and is on pace to increase its negative environmental effects exponentially due to current trends and consumer demands, which often revolve around fast fashion. The textiles economy is then targeted as one that could catalyze immense environmental and social benefits while reaping economic benefits through the adoption of circular strategies along the value chain. Circular business models initially mentioned are then adapted specifically to textiles and many other sub-strategies are described and explained. Five businesses within the European textiles supply chain that are pioneering the use of circular business practices are identified and examined, and conclusions are drawn from these businesses to create “The Entrepreneur’s Guide to Circular Textiles” that can be utilized by emerging or established entrepreneurs that want to make a real and beneficial impact while also exploiting the positive economic repercussions of implementing circular strategies.

2. Conceptualization

2.1. Modern Business – Historical Perspective and Framework

In order to fully grasp the role of business in society and the potential future impact it can have on the earth and all living beings, the general origins of modern business must be identified and the development of this role through the years must be examined.

Modern business is said to have originated in the age of the industrial revolution, after the invention of the steam engine in the mid to late-17th century (Ellen MacArthur Foundation, 2017c). This invention propelled the global economy into the industrial age, and little by little humans began relying on machines and technology to create new production processes and to transport people and goods to different geographical areas. This ability to reach new places and share information across different societies would become the foundation of what has today developed into full-blown globalization. While this change was anything but sudden, generations of businesspeople over the years have implemented many slight variations in processes and operations that gradually made today’s business environment what it is.

While the types of businesses can vary greatly, entities in the private sector have historically had the same goal: make profits so as to grant financial freedom to the company's stakeholders. In general, the economy can be split into three sectors, each sector having its own purpose and stakeholders: the private sector (businesses), the public sector (governmental bodies and organizations) and the nonprofit sector (charities and nongovernmental organizations, or NGOs) (CGC, 2019). This traditional framework will be referred to as the 3-sector model throughout the whole of this investigation. Under the 3-sector model, the public and non-profit sectors exist to provide some sort of benefit or service to society, while the majority of companies in the private sector exist solely to maximize their bottom line (through their products and services), regardless of what stakeholders intend to do with their wealth in the future (Abraham & Mackie, 2005) (Shergold, 2016).

As companies have looked to exploit opportunities that increase revenues or cut costs with the goal of increasing profits, long-term consequences and ripple effects have often gone overlooked. Because of a business's implicit duty to provide for its shareholders and other stakeholders financially, modern business has become obsessed with short-term capital gains. While this short-term financial mindset has created much wealth for stakeholders in developed, capitalist markets, it has often done so at the expense of extreme material and energy waste and has also led to other societal issues, like an ever-increasing financial disparity between the wealthy and the poor (Ellen MacArthur Foundation, 2014). All in all, the environment and people living in poverty-stricken areas in developing countries around the world have taken the brunt of the negative impacts of business.

This financial disparity between the wealthy and the poor, also known as the wealth gap, highlights the economic effect that human activity, especially through private business, can have over an extended period. From a societal standpoint, an excess of funds on one end and a severe lack of funds on the other can, over time, lead to a gross difference in the opportunities available to individuals. The same way that gaps can be observed in the wealth of individuals and furthermore in the opportunities available to those individuals, there also exists a measurable 'gap' in reference to the environment. If a difference exists in the annual amount of resources being taken from the earth and the amount of resources that the earth can regenerate on its own in that same period, one could argue that humans are using more than they should be. Unfortunately, the way that business has operated since the industrial revolution can be characterized by a general disregard for nonrenewable resource use and the use of renewable resources at a rate faster than which these materials can be naturally replenished.

This model of production and consumption is a linear one, meaning that materials are taken from the earth, processed into products, and then sold to consumers, with the consumer

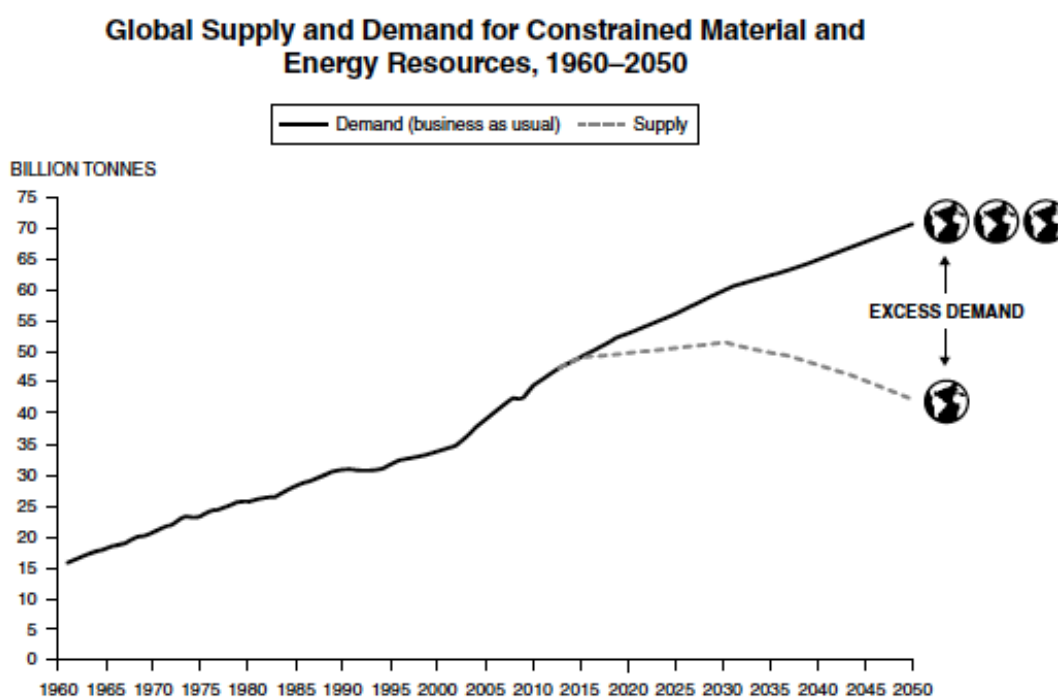
disposing of the product at the end of its useful life, which refers to the amount of time or number of uses a product can be employed for its original purpose (Ellen MacArthur Foundation, 2014). While referred to as the linear model of production of consumption because of the way it can be characterized by a straight line going from resource collection to product disposal, it is commonly referenced as the take-make-dispose (TMD) model (Rossé, et al., 2016). It has also been called the take-make-use-dispose (TMUD) model, adding an important aspect of consumer use of the product to the 'life' of the product model (European Commission, 2020a).

Wasteful practices such as the TMD model have been the lifeblood of modern industry, and while they have created an immense amount of wealth and certainly increased the quality of life for many people over the last century and a half (CGC, 2019), the unintended environmental, social and economic effects have drawn attention to the fact that the traditional economic regulatory systems are outdated and have been for quite some time (Handy, 2002). The linear, or TMD, model of production and consumption has created environmental, social, and economic disparities that, if continued at the current pace, will continue to cause serious, potentially even irreparable damage to Planet Earth in the coming years (Ellen MacArthur Foundation, 2015). All this said, protecting the environment is ironically seen as a social cause, even when the absence of an environment would render almost any private business economically useless (Porter & Kramer, 2002).

However worded, these 'gaps' are the negative effects of business in the 3-sector system over a period of many generations. The social, economic, and environmental 'loose-ends' that businesses leave behind through their normal operations are referred to as their negative externalities. Negative externalities can vary and include the obviously detrimental effects of high levels of greenhouse gas emissions, the death of marine life due to the ever-increasing issue of plastic waste found in our oceans, or overconsumption of scarce resources (CGC, 2019). Negative externalities far exceed these explicit examples and the implicit costs associated with them should also be included, such as environmental cleanup costs and public health expenses to treat people that are made sick by excess pollution (Ellen MacArthur Foundation, 2014) (Rossé, et al., 2016). The Philippines, for example, is not only ravaged by extreme plastic waste within its waterways, threatening marine and human life alike, but also sees a decrease in tourism due to secondary health concerns and the simple fact that the heavily polluted rivers and shores are unpleasant sights (Rossé, et al., 2016). Such earthly plights and sorry sights have led scientists across the globe to wonder and, more importantly, research the effects that human activity has on the globe and whether their current consumption habits are feasible in the long run.

The ensuing, and still ongoing, scientific discourse following this research concluded that the rate at which humans consume natural resources is not something that can be sustained for many more years to come. In fact, it was determined that at the current rate of consumption and its projected increase, humans will be using three times as many resources than the world has to offer annually by the year 2050 (shown in Figure 1) (European Commission, 2020a).

Figure 1: Global Energy and Resource Consumption, 1960-2050



Source: Lacy & Rutqvist (2015)

This realization is significant because it creates an added pressure for humans to find a way to reduce consumption levels and it incentivizes responsible consumption of raw materials looking forward. The idea that our activity cannot be sustained in the long-term is a topic that has, for the last 30 years or more, been at the forefront of environmental discussions as they relate to human habits: sustainability. From a literal standpoint, ‘to sustain’ is defined as “to cause or allow something to continue for a period of time” or even “to keep alive” (Cambridge Dictionary, 2021). Keeping the earth alive for future generations is the least that humans can do, given the great wealth and ever-advancing technologies at our disposal.

From a political standpoint, the idea of developing the economy sustainably, and the resulting term of sustainable development, has its roots in the investigation of the Brundtland Commission from the year 1984 to 1987 and the posterior Brundtland Report published in 1987. Also known as “Our Common Future,” this report outlined the challenges the human economy faces in terms of not spoiling the environment for future generations and presented the idea of sustainable development: development that meets the needs of the present without

compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987). The report goes on to mention many factors that can complicate this seemingly simple definition, like limitations imposed by the state of technology and the ability to communicate and organize on a global level. Furthermore, it maintains that 'needs' must be defined in way that it could be applied to all countries across the globe, developed and undeveloped. Ultimately, the members of the Brundtland Commission defined sustainable development as follows:

“In essence, sustainable development is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development; and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations” (World Commission on Environment and Development, 1987).

While “Our Common Future” set the basis for sustainable development as a society, measuring sustainable activity in terms of a specific business, group or organization has been an extremely difficult task. As mentioned, a company’s success has been measured by how much money it makes. However, with the relatively recent emphasis on sustainable activity and development, new methods of measuring a business’s success, not only economically but also environmentally and from a social perspective, have been thought up.

Of these methods, the triple bottom line has had the most widespread success, a term coined by the British sustainability consultant John Elkington less than a decade after the publication of the Brundtland Report (Slaper & Hall, 2011). The triple bottom line refers to the three dimensions of sustainability: the economic dimension, the social dimension, and the environmental dimension. These three dimensions are referred to as the 3 Ps: people (the social dimension), planet (the environmental dimension), and profit (the economic dimension). While a business’s profit is the easiest to measure because it is naturally quantified into dollars, euros, or some other currency, Elkington argued that accounting principles could be used to quantify the net social and environmental effects that a company has, even if there’s not a universal method for calculating the triple bottom line. The key factor in this quantification is deciding on a unit of measure for these second and third dimensions; profit is measured in dollars, sure, but what about social impact or environmental health? Ultimately, the unit of measurement can be many different things: dollars, net change in crime rate, decrease in greenhouse gas emissions, etc. Depending on the level of impact (local, state, national, global), various factors can be included into an index in order to attempt to assess the effect on all three dimensions. The Genuine Progress Index (GPI), for example, consists of 25 different variables encompassing economic, social, and environmental factors that are then

each converted into monetary units and ultimately summed into a single, dollar-denominated measure (Slaper & Hall, 2011).

It's important to mention that many factors can be measured. In Table 1, potential economic, social, and environmental variables that can be included into the calculation of the triple bottom line are listed.

Table 1: Potential factors in calculating the Triple Bottom Line

<u>Economic Factors</u>	<u>Social Factors</u>	<u>Environmental Factors</u>
<ul style="list-style-type: none"> ○ Revenue and profit ○ Job growth ○ Cost of underemployment ○ Personal income 	<ul style="list-style-type: none"> ○ Unemployment rate ○ Crime rates ○ Average commute time ○ Median household income 	<ul style="list-style-type: none"> ○ Greenhouse gas emissions ○ Waste management ○ Change in land use ○ Electricity consumption

Source: Own elaboration based on Slaper & Hall (2011)

While there has been much focus in the business community on sustainability and sustainable development in the years since the release of "Our Common Future," it's true that these terms have been used excessively just to get the attention of consumers. Also overused is the "equally vague and unquantifiable adjective" 'green', which suggests some sort of unidentified environmental value but does nothing in the way of explaining what actual benefit a product or process has on the environment (Engelman, 2013). Fortunately, there are ways to combat these baseless claims by confirming and relaying information regarding the environmental impact of a material, product, or service, but political action is required to mandate that this information become publicly accessible.

Two important aspects of any business that can prevent greenwashing are transparency and traceability. Transparency refers to the passing of honest information from an entity to the public. The 3-sector model does not require the same level of transparency for the private sector as it does for the public and nonprofit sectors. Private businesses must be forthright with their financial statements within the given time periods, but this information is mostly quantitative and does not provide a real in-depth look into ethical decisions that a company is forced to make. If transparency is the general availability of information as it related to a specific group or company, then traceability is the specific information about the exact source of a product and its components. Traceability serves the function of verifying sustainability claims by providing consumers with relevant information regarding the location, distribution and application of a product and the different components and materials used in that product (UN Global Compact, 2014). In Table 2, some factors are outlined to better explain the nuances of both terms.

Table 2: Elements of Transparency and Traceability

<u>Transparency</u>	<u>Traceability</u>
<ul style="list-style-type: none"> ○ Refers to the requirement of all relevant information to be made available to all levels of the supply and value chains ○ Is an effective tool in risk management ○ Currently, relevant information is often only available at specific levels of the supply chain ○ Supported and facilitated through software 	<ul style="list-style-type: none"> ○ Tracking products and materials through all stages of production, processing, and distribution ○ Used for actors to gain information on partners that are upstream in the supply chain ○ Ensures that sustainability claims are reliable ○ Closely related to environmental impact, labor conditions and anti-corruption ○ Supported and facilitated through software

Source: Own elaboration based on Richero & Ferrigno (2016), UN Global Compact (2014)

By creating policies that require private businesses to provide the public with information about their production process and their supply chain partners, governments can put more economic power in the hands of the people, allowing them to choose which businesses they want to support. In Europe, policymakers have recognized the need for increased levels of transparency and traceability, which is why they introduced the ‘EU Ecolabel’ in 1992, allowing products that were sourced and manufactured sustainably to be sold with the Ecolabel symbol (European Commission, 2020b). This, however, was a voluntary label and no company was required to submit information regarding sourcing and production, meaning that companies acting sustainably were rewarded, but that companies acting unsustainably were not penalized.

More recently, in the European Commission’s 2019 “The European Green Deal,” which looks to make Europe the first climate-neutral continent in the world, policymakers stressed the importance of greater levels of transparency, especially with environmentally damaging materials (European Commission, 2019c). In 2015, the United Nations released “Transforming Our World: The 2030 Agenda for Sustainable Development,” in which 17 Sustainable Development Goals (SDGs) were proposed as key drivers for achieving sustainable human activity on a global scale by the year 2030 (United Nations, 2015). The agenda is, in a larger sense, an action plan for the three dimensions of sustainability, which are in this case described as people, planet and prosperity. It also names peace and partnership between all stakeholders in society as overarching themes in achieving the goals (United Nations, 2015). All 17 SDGs are presented visually in Figure 2.

Figure 2: UN Sustainable Development Goals



Source: United Nations (2019)

These goals have been set, in short, because the current majority of private businesses across the globe are not doing enough to ensure that they're acting sustainably. At the same time, the level of policy in existence that obligates private businesses to act sustainably is insufficient. And while the consumer ultimately holds vast economic power by choosing which companies to purchase from, the public is not well-enough informed, generally speaking, to make the difference that it could.

The current 3-sector economic model coupled with a linear model of production and consumption is unsustainable in the long run, and the negative externalities associated with these outdated models are becoming more and more extreme with each passing year. Both private companies and governments must find innovative ways to make business practices more sustainable and for new policies to incentivize responsible, sustainable behavior. Governments and policymakers can do this in various ways, including encouraging cooperation and information sharing across sectors and supporting businesses that first identify the environmental or social impact that they'd like to make before thinking about how they can maximize financial gains. These for-purpose or for-benefit, rather than for-profit, businesses require a high level of transparency so that the progress towards meeting their goals can be tracked efficiently. This means that in order to be effectively transparent, they would have to agree to be legally bound to make all relevant information public and their progress would be monitored and their results would ultimately be reported to stakeholders (CGC, 2019). Private business, on the other hand, needs to find new strategies to break away

from the TMD model of production and consumption, and one way to do that is by transforming their linear business models into circular ones.

2.2. The Circular Economy

The mainstream focus on the combination of economically, socially, and environmentally sustainable business behavior is something that continues to gain steam year in and year out. This is thanks in part to the Ellen MacArthur Foundation and its release of the first “Towards the Circular Economy” report in 2012, in addition to other reports outlining the Circular Economy (CE) as a potential solution to the negative externalities of modern business.

In reality, the idea of aligning industrial activity with environmental responsibility is something that dates back to the 1980s. In an article from 1989 in *Scientific American*, titled “Strategies for Manufacturing,” authors Robert Frosch and Nicholas Gallopoulos stressed the need for innovation when referring to the future of industry, citing then-current resource use and projected population growth as unsustainable in the long-term if the standard of living in developed countries was to be extrapolated to the global population. In the same article they suggested the idea of an industrial ecosystem, where waste from certain industrial processes would be utilized as raw materials for other, different industrial processes (Frosch & Gallopoulos, 1989). While the negative externalities associated with industry affect all three dimensions of sustainability, the situation is most dire for the environment (Kirchherr, et al., 2017). Thus, the CE is presented as a long-term solution to the immense creation of waste and loss of value caused by the TMUD model.

The Circular Economy derives its name from the idea of transforming the linear (TMUD) model of production and consumption to a circular economic model, where resources are reutilized as many times as possible and goods, at the end of their long, useful lives, can be plugged back into the production cycle as an input for the same or a different good. This circular model is ‘restorative by design’ (Ellen MacArthur Foundation, 2012), meaning that the inputs and their qualities are selected from the very beginning with the intention of being used later in the production of another product or as recyclable material. While CE principles have commonly been associated with recycling materials at the end of a product’s useful life, this is actually seen as a last resort among all CE strategies because it implies that waste is created, something that circular strategists look to avoid (Kirchherr, et al., 2017) (Rossé, et al., 2016). That said, recycling continues to be a very useful tool and a strategy that can be used to recover value from materials that are no longer being used, while having the doubly positive effect of preventing certain materials from being improperly disposed of.

While the term recycling is widely used to indicate the reprocessing of materials into usable inputs, it's important to make the distinction between two different types of recycling: downcycling and upcycling. Downcycling refers to the reuse or reprocessing of recovered materials into a product that is of lower value than the original product, while upcycling is the process of retaining material value or actually creating a more valuable product out of waste. A few simple examples of these two types of recycling are presented in Table 3 below.

Table 3: Examples of Downcycling and Upcycling

<u>Downcycling</u>	<u>Upcycling</u>
<ul style="list-style-type: none"> ○ Shredding old materials for insulation or carpeting ○ Melting metals together to create lower quality alloys ○ Incinerating materials for energy recovery ○ Turning old t-shirts into rags ○ Recycling collected plastics into single use plastics 	<ul style="list-style-type: none"> ○ Repurposing old fabrics into quilts or tote bags ○ Repurposing faulty microchips into jewelry ○ Recycling plastic PET bottles infinitely ○ Turning empty glass bottles into cups or mugs ○ Making furniture out of reclaimed wood

Source: Own elaboration based on McDonough & Braungart (2013), Stahel (2010)

Admittedly, the grand majority of all recycling is actually downcycling. A clear downside of downcycling, when compared to upcycling, is the fact that value is lost each time an old product becomes a new one. Unfortunately, when a product is made up of different material components, downcycling can also be quite expensive, and the energy consumed in processing can even be more valuable than the materials being recycled (McDonough & Braungart, 2002)(Reike, et al., 2018). This is because when post-life planning does not form part of the design phase of product creation, the goal is often to bring a product to market at the lowest feasible cost and does not incorporate that product's degree of recyclability or reusability. This systemic flaw in the mainstream design of products is a recurring theme in the argument for circularity.

To understand the many ways that products and their materials can be recycled in an efficient and cost-effective manner at the end of their useful lives, one must know how different materials can find a future use. In the book "Cradle to Cradle – Remaking the way we make things," released in 2002, authors William McDonough and Michael Braungart present the concept of 'Waste equals Food,' where all materials are nutrients that can and should be reincorporated into either biological or technical cycles. Materials that can be naturally returned to the earth's biosphere to be consumed by microorganisms or other animals, such as food waste and other plant-based creations, are referred to as biological nutrients. On the other hand, materials that can be returned to industry in closed-loop technical cycles are called

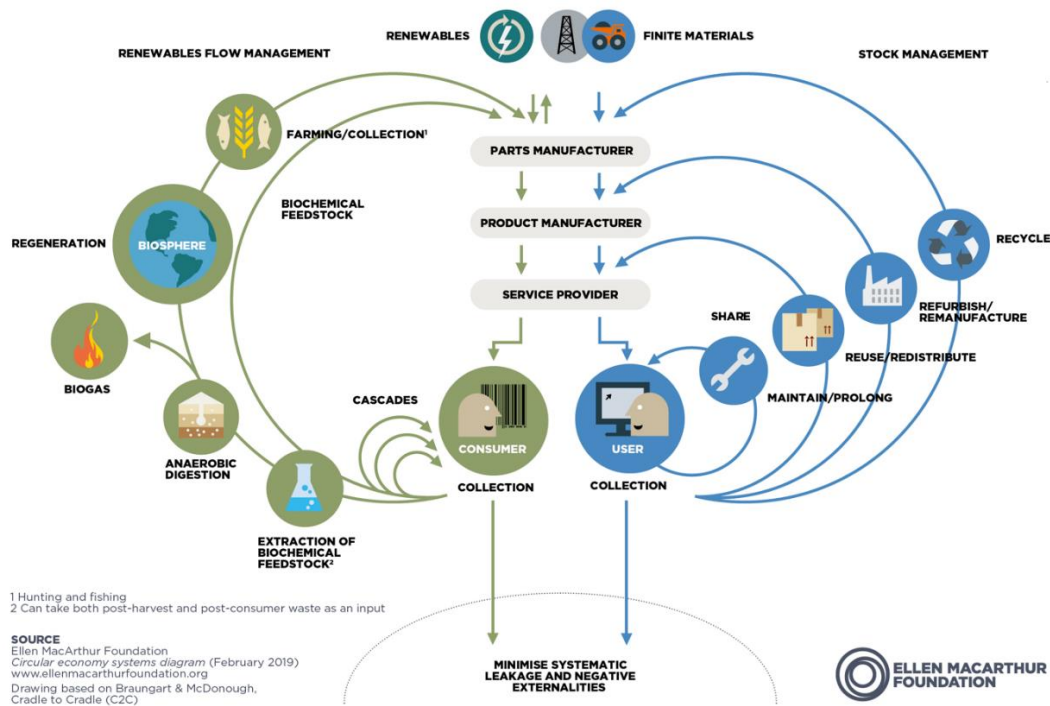
technical nutrients. The design and material-planning components of the production process for technical nutrients are extremely important because for a material to stay in a closed-loop cycle permanently the materials must be able to be isolated at the end of their useful life (McDonough & Braungart, 2002). For this reason, McDonough and Braungart warn against the creation of what they call ‘monstrous hybrids,’ or products that are made up of a mix of many different technical and biological materials. At the end of these products’ useful lives, it can be extremely difficult, if not impossible, to isolate and recover the materials, thus creating unnecessary waste that neither serves as an input for industry nor food for the biosphere (McDonough & Braungart, 2002). While recycling will continue to be an extremely important circular strategy so long as waste from industry exists, there are other strategies to examine that also offer value-creating and value-salvaging ideas.

The Ellen MacArthur Foundation (EMF) is universally recognized as a leader in making CE strategies mainstream ideas and has defined the term Circular Economy on multiple occasions, each year updating its information and potential strategies to include the latest technological innovations. Below is the most recent definition offered by the EMF:

“A circular economy is a systemic approach to economic development designed to benefit businesses, society, and the environment. In contrast to the ‘take-make-waste’ linear model, a circular economy is regenerative by design and aims to gradually decouple growth from the consumption of finite resources.” (Ellen MacArthur Foundation, 2017c)

In Figure 3, the EMF’s Circular Economy System Diagram, also referred to as the Butterfly Figure, is a visual representation of how both biological (green) and technical (blue) nutrients can be reincorporated into closed material loops with various re-entry points. For example, when technical nutrients are recollected after the consumer is finished with them, they can be reused by another consumer, redistributed to a product manufacturer, or recycled into new inputs to be used by a parts manufacturer. For biological nutrients, they are usually either returned to the biosphere as biogas or digestate through the process of anaerobic digestion, which is the breaking down by microorganisms without the presence of oxygen, or they are used as biological feedstock (United States Environmental Protection Agency, 2021). In both cases the goal is to minimize both leakage (when materials escape from the closed loop) and negative externalities. By implementing circular policies and strategies, businesses can receive immense economic benefits while also eliminating their negative externalities, resulting in a net-positive effect (Ellen MacArthur Foundation, 2014) (CGC, 2019).

Figure 3: Circular Economy System Diagram



Source: Ellen MacArthur Foundation (2019)

While there are many strategies that can be considered ‘circular’ in terms of environmental impact and economic benefit, a few concepts can be explained to highlight the overarching frameworks behind the many ideas that represent the CE. The EMF’s ReSOLVE Framework, presented in Table 4, is seen as a way to rethink the products that we use and the processes behind the production of those products (Ellen MacArthur Foundation, 2015) (Rossé, et al., 2016).

Another way of explaining the CE is known as the R Framework, and while there are different types, the most used are the 3R and 4R Frameworks (Kirchherr, et al., 2017). Both frameworks use ‘R words,’ or strategic levels in a waste hierarchy listed by potential environmental impact, when developing circular strategies. The 3R and 4R frameworks are the same, only the latter includes ‘recover’ as a final strategy. The 4R Framework is explained in Table 5.

Table 4: ReSOLVE Framework

<u>Term</u>	<u>Definition</u>
<i>Regenerate</i>	→ Improve the health of the earth's ecosystems via renewable materials and proper waste management
<i>Share</i>	→ Share products that do not need to be owned and that, if shared, could provide consumers with satisfaction as a service (i.e., ridesharing applications) → Maximize utilization of products and eliminate downtime or periods of minimal use
<i>Optimize</i>	→ Enhance efficiency and performance of products → Eliminate waste wherever possible → Leverage the power of technology
<i>Loop</i>	→ Keep components in closed loops so that their reuse is maximized and no value is lost → Extract biochemicals and anaerobically digest what's left → Salvage whatever value possible from components that must exit the loop
<i>Virtualize</i>	→ Provide a product or service virtually wherever possible. In today's day and age, technological advancements have allowed companies to provide their services via mobile phone or computer applications. This strategy extremely reduces the number of physical materials and/or resources that are needed to satisfy consumers.
<i>Exchange</i>	→ Switch out old, nonrenewable inputs wherever possible with renewable inputs. → Apply technology to processes in order to swap out strategies that use excess waste (3D printing, rechargeable batteries).

Source: Own elaboration based on Ellen MacArthur Foundation (2015), Rossé et al. (2016)

Table 5: 4R Framework

<u>'R word'</u>	<u>Definition</u>
<i>Reduce</i>	Refers to the reduction in harmful materials and wasteful habits, as well as the desired decrease in carbon emissions. This strategy prevents unnecessary resource use.
<i>Reuse</i>	Refers to the idea of the 'closed material loop' and the ability to exploit value that could be trapped in an old product or a seemingly useless material. Processes like repairing and redesigning products to prolong their useful life form part of this strategy.
<i>Recycle</i>	Refers to how materials are dealt with at the end of their useful life. There is much value to be found within our waste systems and recapturing that value will create less need for future waste creation.
<i>Recover</i>	Refers to the last-resort strategy of incinerating any non-reusable waste to salvage energy. It should be noted that there are many ways to 'recover' value, and that incineration is the explicit strategy in the 4R Framework.








Source: Own elaboration based on Kirchherr et al. (2017)

The use of these 'R words' is considered a waste hierarchy, meaning that they are presented in a specific order based on the overall impact the implementation of each strategy will ultimately have on waste creation. In these two frameworks, reducing production and consumption will have the largest impact while recycling and recovery are value-salvaging strategies for waste once it's already been created (Kirchherr, et al., 2017). In 2008, China became the first country to pass legislation that would encourage circular behavior with the "Circular Economy Promotion Law." This law focused on the implementation of the 3R Framework and waste hierarchy, with the recovery strategy frequently being mentioned

alongside recycle (People's Republic of China, 2008). By enacting this law, China ensured that their trajectory towards a circular economy would be top-down (starting with the government), while in the EU and USA progress has been made in a bottom-up approach (starting with consumers, NGOs, and environmental organizations) (Ghisellini, et al., 2016).

In the past decade or so, new 'R frameworks' have emerged to incorporate more 'R words' into the waste hierarchy as waste management strategies. The re-organization of the 3R Framework into the 10R hierarchy in 2018 (Reike, et al., 2018) is one of such newer frameworks, where the ten 'R words' are referred to as resource value retention options (ROs) and are separated into categories according to each group of activities' distance from the consumer and thus, their priority. The three categories, starting with the group closest to the consumer, are short loops, medium long loops, and long loops. This 10R Framework, inclusive to the original 3R Framework, is presented in Table 6, and to better relate each RO to its potential impact or benefit, Figure 4 is presented as a legend for Table 6.




































Figure 4: Legend for RO impacts in Table 6









	Material Life Extension
	Decrease in waste creation or increase in waste management
	Reduced GHG emissions
	End-of-life design thinking
	Responsible consumer behavior
	Phasing out of hazardous materials
	Decrease in nonrenewable resource use

Source: Own elaboration

While these 'R frameworks' help shed light on many of the strategic facets of the CE, more concrete strategies and business models have been developed with the aim of capturing even more value. In simple terms, a circular business model should be feasible from an economic standpoint and incorporate strategies that facilitate the continuous use and reuse of products and their components, utilizing renewable inputs wherever possible (Bocken, et al., 2016).

Table 6: 10R Framework: Resource Value Retention Options (ROs)

Short Loops		Recognized as the preferred resource value ROs as they take place closest to the consumer	
RO	Definition	Impact(s)	
R0: <i>Refuse</i>	Refers to both the producer and the individual consumer, where the consumer <i>refuses</i> purchases that lead to unnecessary waste creation as well as products of consumption, such as excess packaging or plastic bags. In the case of the producer, they might <i>refuse</i> the use of hazardous or nonrenewable inputs as well as design processes that create waste.	    	
R1: <i>Reduce</i>	Refers in large part to producers and the role they place in waste creation. By <i>reducing</i> the amount of material used per unit, total resource use can be decreased. Can also refer to phasing out hazardous material use. Also implies that the consumer <i>reduces</i> purchases they make on products that become waste in the short-term.	     	
R2: <i>Resell / Re-use</i>	There are many applications of this RO, such as reselling or donating a seldom-used product so that someone else can use it. Implies that products are designed to be used over a long period and encourages business models that facilitate sharing and secondhand sales. Producers can also participate in recollection schemes that allow them to find products a new home with minimal modifications.	     	
R3: <i>Repair</i>	Not to be confused with <i>refurbish</i> , refers to the ability by different parties (without ownership) to make a product work again after it is defected. Can be performed by the producer, the consumer, or third-party actors.	     	
Medium Long Loops		Generally seen as business activities that are seldom related to the consumer	
RO	Definition	Impact(s)	
R4: <i>Refurbish</i>	Usually in reference to 'large multi-component products,' such as buildings and large vehicles, that are in overall good condition. To <i>refurbish</i> would be to modernize a product with newer and better components. Often likened to an upgrade whose final quality is specified beforehand.	   	
R5: <i>Remanufacture</i>	Sometimes referred to as <i>reconditioning</i> , <i>reprocessing</i> , or <i>restoring</i> , this RO involves the complete disassembly of a multi-component product and the replacement of designated or faulty components, potentially with recycled ones, with the goal of returning the product to its original state (but not upgrading it).	   	
R6: <i>Repurpose</i>	Refers to the use of products or their components for a function that is different than the product's original purpose. Sometimes called <i>rethink</i> .	   	

Long Loops		Recognized as the least desirable value ROs and often likened to waste management. That said, recovered materials in long loop recycling can be used as inputs for the shorter loop value retention options
RO	Definition	Impact(s)
R7: <i>Recycle</i>	Often referred to as the collection and processing of post-consumer and post-producer waste streams, with pre-consumer collection being advantageous. The quality of the end result can vary greatly depending on the material and the ability to isolate the material. Few materials can be reprocessed to achieve the same level of quality of virgin inputs when isolated, among them certain metals and PET, while for other materials the high-energy processes used in recycling often outweigh the value of the final product.	    
R8: <i>Recover</i>	Not to be confused with the collection of products or components at the end-of-life, refers to the incineration of materials at the end-of-life stage for energy production or as biomass (plant or animal waste used as fuel).	
R9: <i>Re-mine</i>	With origins in scrapping waste to salvage materials, refers to retrieving valuable materials that have ended up in landfills. It has been argued that mineral concentration in landfills is higher than that of an actual mine, yet this value retention option receives little attention compared to others. Can be harmful to people who are doing the scavenging, as hazardous materials and substances are released.	 

Source: Own elaboration based on Reike et al. (2018)

At the forefront of circular business models presented in previous years are the 5 models presented by Peter Lacy and Jakob Rutqvist in their 2015 book titled “Waste to Wealth: The Circular Economy Advantage.” These models are in line with the EMF’s definition of a CE and are geared toward differentiation, cost and risk reduction, increased revenue (including new revenue streams) and a decreased dependence on nonrenewable resource use (Lacy & Rutqvist, 2015). They are not intended to be mutually exclusive, and there is potential for a business to exist using a combination of two or more of the 5 models. An overview of the models is offered below and in the next section variations of these models are presented as they might apply to the garment industry and, more importantly, a circular textiles economy.

1. Circular Supply-chain:

Prioritizes the use of renewable, recyclable, or biodegradable resources as inputs. In the best case, these inputs would be used repeatedly in an infinite amount of life cycles. The goal is to reduce costs and increase both predictability of resource availability and control of the resource(s). Used when faced with resource scarcity or high input costs. Examples

include composting waste to make fertilizer or using infinitely recyclable inputs, like PET or steel.

2. Recovery and Recycling:

Uses the 'waste' from either the end of a product's useful life or the material/energy 'run-off' associated with actual production. Involves redirecting materials to anywhere but a landfill. Examples include collecting post-production waste scraps and reincorporating them as inputs or collecting materials from consumers at the end of a product's useful life through a take-back system.

3. Product Life-extension:

When products grow old, go out of style, break, or simply stop serving their initial purpose, consumers at the end of the supply chain dispose of them. However, when companies emphasize quality, durable, reusable, and upgradeable inputs, a product has a much longer useful life and serves the consumer for longer periods. This not only prevents premature disposal, but a special, long-term relationship is formed between company and consumer. Additionally, focusing on product durability creates secondary opportunities even if the initial consumer decides they no longer want the product. So long as functionality is not entirely compromised, an entire resell market might thrive where people who previously could not afford the product are suddenly able to. Examples include repairing a broken product or refurbishing one that could be upgraded, as well as planning for durability and repairability starting with the design phase.

4. Sharing Platform:

By renting, lending, swapping, or sharing, businesses and individuals can take advantage of consumer goods that spend their useful lives sitting idly or 'waiting to be used,' such as products in the electronic and automobile industries. Sharing platforms have a plethora of applications, as many modern businesses exist to pair product users and product owners. This model aims to ensure that a product goes through its entire useful life before it's disposed of (repaired, repurposed, etc.). Examples include ridesharing mobile applications and other platforms that connect products or services with users.

5. Product as a Service:

When a business or manufacturer bears the total cost of ownership (TCO) of a product throughout its entire useful life and consumers simply lease or rent the product when they need it or want to use it. This model leads to products that have long useful lives and are both reusable and reliable because it is in the company's best interest to utilize the product throughout its entire useful life. Performance and longevity become the key aims of any product, while products that won't last due to cheap inputs are shunned from a profitability standpoint. Examples include lighting and electricity as a service, machine rentals and carpet leasing, among others.

After examining different concepts and strategies under the CE umbrella, it becomes evident that to build the CE of the future successfully and sustainably humans must engage in a multitude of activities, and that to associate the CE with ‘recycling’ only would undermine its value and potential. Additionally, the push towards circularity must be a joint effort between private and public sectors. Currently, political incentives are not strong enough to encourage private businesses to curb the huge amounts of waste that they create. These incentives can come in many forms: In 2020, the European Commission adopted the new Circular Economy Action Plan (CEAP) to encourage sustainable production, as up to 80% of the overall environmental impact of a product at the end of its life is determined at the design phase (European Commission, 2020a).

Obvious environmental advantages, coupled with economic benefits and a better image in the eyes of the public, will serve as factors that exponentially increase the amount of business opportunities presented to companies by normalizing the CE. In the next section, the global textiles industry is targeted as a prime area of opportunity for CE strategies.

2.3. The Modern Textile Industry

2.3.1 Analysis of the Current Textile Industry

Circular economic principles and policy changes made within the EU in recent years to move toward a European CE can be paired with the business models brought forth by Lacy and Rutqvist in 2015 and applied specifically to the textile/garment industry to achieve extreme environmental, social, and economic benefits while eliminating many of the current negative externalities within the industry. Offsetting these negative externalities is the first step in reaching the long-term goal of restructuring the textile system to facilitate an entirely circular textiles economy. This resulting circular textile system is defined by the EMF below:






“one that is restorative and regenerative by design and provides benefits for business, society, and the environment. In such a system, clothes, textiles, and fibres are kept at their highest value during use and re-enter the economy after use, never ending up as waste.(Ellen MacArthur Foundation, 2017b)”

To implement a textiles system that properly encapsulates the above definition, value chains must be deeply integrated, which will require immense collaboration and coordination between actors across the textile value chain. This is particularly true given the fact that any given textile product can pass through the hands of dozens of different stakeholders across multiple continents before arriving to the final customer (European Commission, 2019a). The need for this high-level coordination further supports the call for more cooperation in the modern business environment. Not only would this circular application to the textile industry put the EU in a more competitive trade position on a global scale, but it would also allow European

businesses along the textile value chain to better serve the demands of European consumers while improving the lives of garment industry workers, the majority of whom live and work outside of Europe (European Commission, 2019a).

In order to fully comprehend the environmental, social, and economic impacts of a circular textiles economy within the EU (and across the globe), its impact must be analyzed from all three dimensions. Currently, the global textile industry is one of the best examples of how the TMUD linear model of production and consumption results in inefficiencies and large-scale loss of material value. The textile industry ‘at a glance’ is presented in **Table 7** below.

Table 7: The Textile Industry at a Glance

<i>The Textile Industry at a Glance</i>	
<u>Impact Area</u>	<u>Effect</u>
Water and Resource Use 	<ul style="list-style-type: none"> The global textile industry is the 4th-highest user of primary raw materials and water, behind food, housing, and transport Some 2,700 liters of water are necessary to produce one cotton t-shirt, the equivalent of 900 days of drinking water for the average person In 2019, some 2 billion cotton t-shirts were produced across the globe Almost 90% of virgin inputs for clothing production are polyester (about 63%) and cotton (about 26%) Polyester fiber production, a petroleum-intensive process, uses some 70 million barrels of oil annually
Greenhouse Gas Emissions 	<ul style="list-style-type: none"> The global textile industry ranks 5th in terms of total GHG emissions, and emissions are superior to those of all international flights and maritime shipping combined EU-28 GHG emissions generated from the consumption of clothes, footwear and household textiles equated to 654 kg of carbon dioxide per person in 2017. Only around a fourth of these emissions took place within Europe In 2019, textile GHG emissions amount to 10% of the total global level. This is estimated to be higher than 25% in 2050
Waste and Pollution 	<ul style="list-style-type: none"> In 2016, less than 1% of textile inputs had previously been recycled Some 35% of microplastics released into the environment come from washing synthetic textiles 50% of fast-fashion-produced garments are disposed of in less than a year, while most of the other 50% is eventually lost to landfills and incineration In 2012, some 20% of industrial water pollution could be attributed to treatment and dyeing of textiles
Labor and Supply Chain 	<ul style="list-style-type: none"> It is estimated that 1 out of every 6 people in the world work in within global textile supply chains Around three-fourths of these workers are women Before reaching the final consumer, a typical garment can pass through the hands of dozens of stakeholders
Recent Trends 	<ul style="list-style-type: none"> Clothing production doubled from 2000 to 2014, reaching 14 garments produced per person in 2014. In the same period, annual garment purchases by the average consumer increased by 60% Consumers hang on to garments for half as long compared to two decades ago In the EU, 60% (by value) of clothing is produced elsewhere, and the grand majority of land (93%), water (92%) and resource (85%) use take place outside the EU On average, clothing collection rates in the EU hover around 25%, while in the US, Japan, and China they do not exceed 15%. Collected clothing is usually downcycled

Source: Own elaboration based on Kant (2012), Remy et al. (2016), Ellen MacArthur Foundation (2017a), European Commission (2019b), European Commission (2020a), European Parliament (2020a)

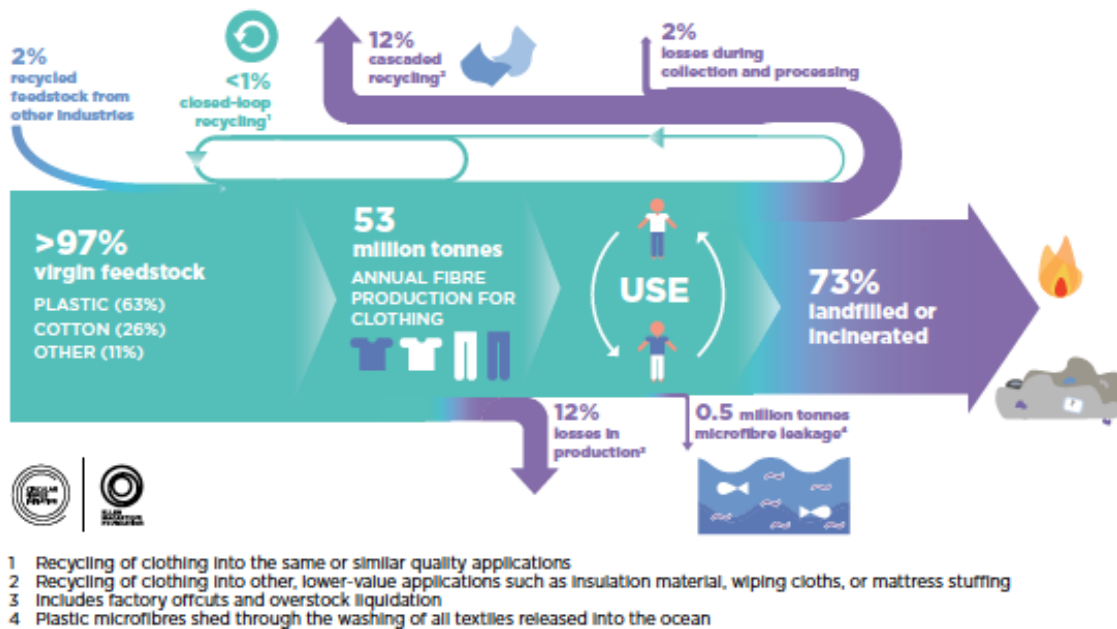
Thanks in large part to the fast fashion movement coupled with a boom in middle-class populations in developing countries, clothing sales have risen to an all-time high. Recent technological developments have allowed fashion giants to cut lead times from clothing design

to in-store sales, resulting in consistent demand for brand new products and styles. Around 2006, Zara, the leader of all Inditex brands, was able to release around 11,000 articles of clothing (not including color and size variations) per year, while its biggest competitors were only producing and releasing anywhere from 2,000 to 4,000 articles of clothing (Ghemawat & Nueno, 2006). This ability to design, produce and sell in such little time can be attributed to reduced input costs, streamlined operations, better data and an increase in consumer spending. Clothing production is currently at an all-time high, approximately doubling from 2000 to 2014, and the number of garments bought annually by the average consumer increased by 60% during the same period (Remy et al., 2016). Some estimates state that between 50% and 60% of clothing is disposed of within one year of its production, while a large part of the remaining garments is eventually lost to incineration or landfills (Ellen MacArthur Foundation, 2017a) (Remy, et al., 2016). Over the last fifteen years, clothing utilization in terms of wears per garment has decreased by about 70% in China, a prime example of the effect of fast fashion on a country with a rapidly growing middle class (Ellen MacArthur Foundation, 2017a).

These trends have resulted in large-scale environmental waste and pollution, and the effects on garment workers have been mainly detrimental. While the same trends have allowed large textile corporations to sell more products faster, this increase in sales is heavily outweighed by the huge loss in value from products that are disposed of before their useful life has ended and the negative externalities that are a direct result of the textile industry's operations. Due to a focus on mass production instead of demand-based production, the textile industry uses large amounts of resources, but not always use them to their full potential. The environmental impact of the textile industry in Europe and across the globe can be analyzed from three perspectives: waste creation, pollution, and its effect on biodiversity.

Overall, the current climate of the textile industry is a wasteful one. As the industry chiefly operates on a linear model of production and consumption, few products or materials are put back into the production loop as inputs, and most textile items are not recycled. In a 2017 report, the EMF provided a materials flow graphic highlighting the average life cycle of textile resources in 2015 (Figure 5).

Figure 5: Global material flows for clothing (in 2015)



Source: Ellen MacArthur Foundation (2017a)

While some fifteen percent of materials were recycled, the majority of this was cascaded recycling, also known as downcycling, where a material is put to another, lower-value use and where it ultimately finishes its useful life. Less than 1% of all inputs in the material flow for clothing had previously been recycled (closed-loop recycling). Figure 5 is a clear representation of the textile industry as a linear model, as almost three-fourths of the total material stream ended up in a landfill or was incinerated to produce energy in 2015. Some estimates state that each second, worldwide, a truck full of textiles is sent to a landfill or to be incinerated (European Commission, 2019b).

Fast fashion has had and continues to have a direct impact on how consumers treat their clothing and the value that they associate with the material used to make these products. On average, consumers today hang on to their garments for about half as much time as they did just 15 years ago and the lower the purchase price, the more the item is seen as disposable, with the lowest-priced items being discarded after just 7 or 8 wears (Remy, et al., 2016). While large-scale efforts have been made to collect garments when their original purchasers no longer want them (in order to save them from incineration or landfills), these reuse and recycle activities are not as efficient as they could be. In Germany, the clear European leader in used clothing collection, almost three-quarters of all used clothing is recollected. About two-thirds of it is donated and reused, while the other third is recycled (Remy, et al., 2016). However, on average, EU member states' collection rates of used clothing are typically only around 25%, while most of the clothing that is collected for recycling is downcycled, and the resulting

material is of lower quality and functionality (European Commission, 2019b). In countries like the United States, China and Japan, collection rates do not exceed 15% (Remy, et al., 2016). Unfortunately, countries that receive large used textile donations often do not have the proper infrastructure for distribution and recollection, meaning that in most cases the donated clothing ends up in a landfill anyways. Moreover, sending clothes to a landfill incurs its own cost, and in the United Kingdom, for example, the estimated cost of sending clothes and household textiles to a landfill has surpassed \$100 million USD per year (Ellen MacArthur Foundation, 2017a).

In terms of nonrenewable resource use, the textile industry currently plays a huge role in greenhouse gas (GHG) emissions, water consumption and water pollution across the globe. Behind the food, housing and transport industries, the global textile industry is the next highest user of primary raw materials and water and is ranked fifth-highest in terms of GHG emissions (European Commission, 2020a). In the current European textiles economy, the per-capita GHG emissions generated from the consumption of clothes, footwear, and household textiles within the 28 countries in the EU was around 654 kg of carbon dioxide in 2017. Only about one-fourth of these emissions took place within the EU's geographical area, shedding light on the environmental and social impact that the demand and consumption for textiles in the EU has on other countries. The European Commission estimated that 8% of all global GHG emissions can be attributed to apparel and footwear (European Commission, 2019b), and furthermore, the EMF reports that in a 'business-as-usual scenario' the textile industry's share of the global carbon budget would be as high as 26% in 2050 (Ellen MacArthur Foundation, 2017a).

As far as water consumption goes, natural textile fibers like cotton and wool require huge amounts of water throughout the production and treatment stages. Cotton, the second-most-common material used in the textile industry, is estimated to make up some 25-30% of all textile inputs in terms of fiber (Remy, et al., 2016) (Ellen MacArthur Foundation, 2017a). Cotton is notorious for its need for large amounts of water, as about 2,700 liters of water is needed to produce one t-shirt. This is equivalent to 900 days of drinking water for the average person, and globally some 2 billion t-shirts are produced annually (European Commission, 2019a). The total estimated amount of water required for the current global textile industry is in the range of 93 billion cubic meters of water per year (Ellen MacArthur Foundation, 2017a).

In addition to exhaustive water utilization, chemicals used to dye and treat textiles are often run off into water channels, polluting water sources that do not form part of the textile industry. In fact, some 20% of total industrial water pollution can be attributed to the treatment and dye of textiles (Kant, 2012). Chemicals are also applied in the production of natural fibers, like cotton, as pesticides and fertilizers are used on crops before cultivation (Remy, et al., 2016).

These chemicals can have serious, harmful effects on the health of people who use these contaminated water sources, even at a large geographical distance.

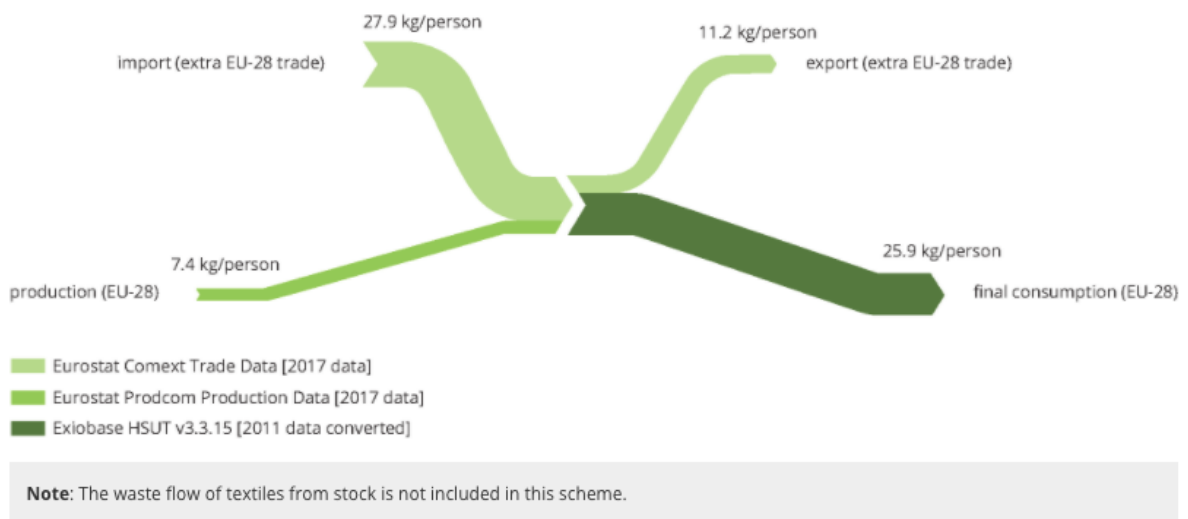
While there are many negative externalities related to cotton, mostly relating to water, polyester is the most used material in all the textile industry. Like other plastics, polyester is produced from oil, and the carbon-intensive processes involved in its production require more than 70 million barrels of oil every year (European Commission, 2019b) (European Environment Agency, 2019). As seen in Figure 5, plastic based fibers like polyester make up more than 60% virgin textile feedstock. Aside from excessive resource use, there are additional, negative environmental effects that come from these materials. When a garment made with plastic-based fibers is washed, plastic microfibers are released into the water supply. Currently, on an annual basis, half a million tons of these microplastics are released into oceans (European Environment Agency, 2019), and from 2015 to 2050, a total of 22 million tons of plastic microfibers are expected to be released into our oceans if no changes are made to the current system (Ellen MacArthur Foundation, 2017a).

Socially, the garment industry's impact takes place mainly outside of the EU. To take advantage of lower labor costs, some 60% of clothing in the EU (by value) is produced elsewhere, and the volume of EU clothing that is produced abroad is higher than 60% (European Commission, 2020a). The disparity between consumption and production within the European textile industry can be observed in Figure 6, which shows that, on average, the net import by weight of textile products in the EU is 16.7 kg per person and that the average European consumes just under 26 kg of textile products per year.

The disparities shown in Figure 6 have many social implications. First and foremost, the production of natural and synthetic fibers outside of the EU means that a grand majority of the negative environmental externalities from EU textile consumption are inflicted upon the land and people in the countries where these fibers are produced and where the textiles are made. In fact, 93% of land use, 92% of water use, 85% of primary raw material use, and 76% of the GHG emissions caused by the consumption of textile within the EU actually take place outside of the EU (European Environment Agency, 2019). These figures are startling, but they fail to include the labor aspect of textile production. It's no secret that Western corporations outsource work to third-party countries, usually in Asia, to take advantage of cheaper labor and to ultimately net a higher profit. These cheap labor practices come at a high social price, however. The conditions for textile factory workers are anything but ideal, often receiving meager wages while putting their health at risk due to unsafe work environments or exposure to chemicals and other hazardous substances (Remy, et al., 2016) (Ellen MacArthur Foundation, 2017a) (European Commission, 2019a). Factory disasters within the global textile supply chain are unfortunately common. In Bangladesh alone, three garment factory accidents

from 2012 to 2017 resulted in the deaths thousands, with the 2013 Rana Plaza Disaster killing more than 1,100 workers (Banerji, 2019).

Figure 6: Import, export, production, and consumption flows of textile products in the EU-28 (in 2017)



Source: European Environment Agency (2019)

It is estimated that one out of every 6 people in the world works within global textile supply chains, and three-fourths of them are women (European Commission, 2019a). This has two important implications: On one hand, any business practice that endangers textile workers will disproportionately endanger women. On the other hand, any company that improves working conditions, transparency, or traceability along the textile supply chain will disproportionately benefit women.

Another social consequence of the current textile climate within Europe and around the world worth mentioning has to do with consumer preferences and activity. As consumers demand higher levels of transparency regarding working conditions, waste management, and environmental effects of production across the entire supply chain, companies that do not adequately provide this information are noticing that modern-day consumers (especially from younger generations) won't hesitate to buy elsewhere. This transparency can be required by policy, and 72% of Europeans think that current policies in the EU are insufficient in terms of company requirements to inform consumers of the environmental and social impacts of their businesses (European Commission, 2019b). An improved system of transparency and traceability between companies and consumers in the European textile industry would not only hold companies accountable for their business practices, but it would also draw attention to those that are engaging in sustainable activities and ultimately give the consumer more power at the time of transaction (European Commission, 2019a).

Finally, from an economic perspective, value lost in material waste and social and environmental ‘cleanup costs’ are some of the biggest issues. The unsustainable nature of production and consumption based on a linear model has led to some bleak future estimates as far as profit for textile corporations goes. If textile and fast-fashion brands continue to produce as they are in the current textile environment, a loss of almost 3.5% in EBIT (earnings before interest and taxes) margins is projected by 2030 (Global Fashion Agenda & The Boston Consulting Group, 2017). This projected EBIT decline is directly correlated to products and materials that are disposed of before the end of their useful lives, among other factors. The economic future of individual companies will rely not only on the mitigation of aforementioned negative environmental and social effects but also on their ability to be straightforward with the public about which practices they use. In this regard, transparency and traceability become ever more important for creating customer loyalty and building trust between companies and consumers so that organizations not only adopt circular strategies, but their customers also know about them (European Commission, 2019a).

In effect, the negative externalities of the global and European textile industries currently severely outweigh the industries’ potential for positive impact due to extreme waste creation and poor management of that waste, and there is huge potential in all three dimensions for a circular textiles economy, especially in the EU.

2.3.2 Applying Circular Strategies to the Textile Industry

After analyzing the current textile environment within the EU and around the world, it becomes clear that CE principles can be applied to not only eliminate negative externalities but to impact the environment, society, and the economy in a positive way. The disproportionate use of nonrenewable resources as inputs, chronic wasting of energy and materials, and contamination of water supplies foster an environment in which value is lost, rather than taken advantage of throughout the textile value chain.

To achieve circularity in the textile and garment industry, the EMF proposes four ambitions that will together serve as guidelines for the industry. These four ambitions are laid out in “A new textiles economy: Redesigning fashion’s future” (Ellen MacArthur Foundation, 2017a):

1. Phase out substances of concern and microfiber release:

To achieve a textiles economy that doesn’t harm the environment and the people within it, one of the first things that can be done is remove materials and material wastes that cause damage to the ecosystem. This includes chemicals that pollute waterways and cause hazards downstream, substances that are considered carcinogenic or are dangerous to acquire, and the propagation of microplastics in the form of microfiber release from materials like polyester. Through coordination and innovation, companies and

governments can prioritize the rapid or even immediate phasing out of certain substances, and new solutions can be found to substitute harmful inputs or outputs associated with textile production. An increased level of transparency would also allow consumers to pressure companies that are reluctant to remove harmful substances, especially for those that are proven to have viable, non-harmful substitutes. New technology will also have to be developed so that textile producers can identify the causes of plastic microfiber shedding and different ways to mitigate this microplastic pollution. This ambition will also facilitate the long-term utilization of clothes as well as their recyclability at the end of their useful lives.

2. Increase clothing utilization:

The modern association of clothing and disposability must be reverted. Through technology and design, services and interchangeability, and repair and improved durability, the average number of wears per garment can be significantly increased. Many new opportunities exist in this realm, which would couple the satisfaction of consumer demands like a changing wardrobe with extreme durability so that the same garment could be used by many people throughout its useful life. Platforms that allow people to rent clothes or that facilitate secondhand sales and the exchange of garments have a huge economic opportunity as it relates to this second ambition. In addition, brands that succeed in making durability 'fashionable' will be able to market quality over quantity.

3. Radically improve recycling:

The current recycling system, especially as it pertains to clothes, is inadequate and mostly consists of downcycling. Only the most innovative brands have been able to upcycle lower-value cloth (like trimmings) into valuable garments, however this ability will prove crucial moving towards a circular textiles economy. Improving the way in which and the degree to which clothes can be recycled is intertwined with the design of fabrics used. According to the EMF, it is imperative that clothing design be directly aligned with recycling efforts. This means using materials that can be re woven into new garments at the end of their useful lives. Technological development is extremely valuable to this ambition, for when the price of a recycled fabric can compete with the price of its virgin counterpart, cost is no longer a deciding factor. This idea goes hand in hand with the ability to sustain the demand of recycled materials, which could be supported by large-scale use of clothing collection initiatives. Tracking and tracing garments will also provide insight into which materials have been successfully recycled over time.

4. Make effective use of resources and move to renewable inputs:

When progress towards the second and third ambitions is made, the industry's ability to use less raw materials and nonrenewable resources will skyrocket. While this might not be *the* long-term solution, it can certainly help buy time until technological developments and innovations have provided manufacturers with ways to use entirely renewable inputs in the production of textiles. This ability to use renewable resources as inputs greatly decreases the pressure placed on the environment by the textile industry and allows decreasing levels of harmful waste to be managed more effectively.

These four ambitions can be used as a guideline for assessing whether a business strategy in a company that forms part of the textile supply or value chains is making progress towards circularity. At present, many circular strategies exist that can be directly applied to the industry to recapture value that is lost along the way, from production of materials to the disposal of products by consumers. These circular textile business models are presented in Table 8, where they are described and associated with the ambitions of a new textiles economy offered by the EMF and the circular business models put forward by Lacy and Rutqvist. The following models are outlined in "Service-based business models & circular strategies for textiles" (Circle Economy, 2015).

Table 8: 10 circular textile business models

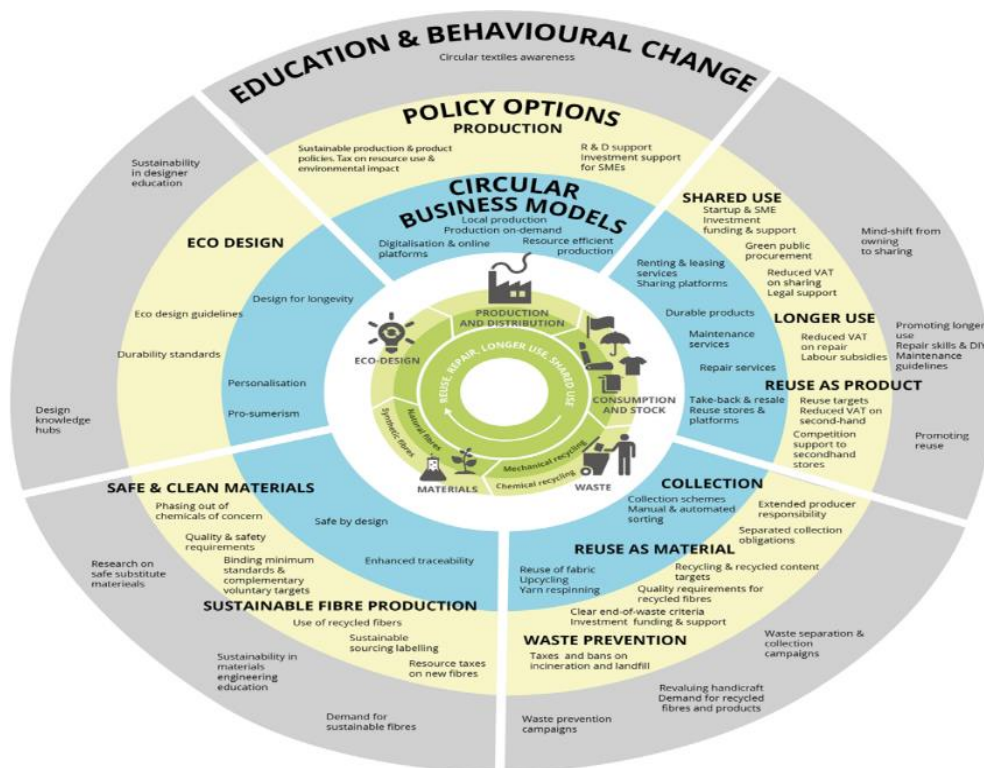
Model Name	Description	Lacy & Rutqvist Model	EMF Ambition
<i>Closed Loop</i>	Models in which products and business processes put waste streams directly back into the production as an input.	Circular Supply-Chain	Make effective use of resources and move to renewable inputs
<i>Reuse</i>	Models that find ways to give products a 'second life' after their initial purpose has been served.	Product life-extension	Increase Clothing Utilization
<i>Recycle (post-industrial and pre-consumer)</i>	Models that can put post-industrial textiles like fabric clippings and pre-consumer textiles like unsold or returned garments to use.	Recovery and Recycling	Radically Improve Recycling
<i>Recycle (post-consumer)</i>	Models that find uses for garments that are at the end of their useful lives and are no longer fit for reuse.	Recovery and Recycling	Radically Improve Recycling
<i>Repair & Warranty</i>	Models that offer or include extra services after the sale of the item to the consumer. Essentially offers the consumer a 'lifetime' garment.	Product life-extension	Increase Clothing Utilization
<i>Renting & Leasing (physical library)</i>	Models oriented towards maximizing the use of a product. People or companies have an extensive physical stock of new or used clothes and rent them out to consumers.	Sharing Platform, Product as a Service	Increase Clothing Utilization
<i>Renting & Leasing (online model)</i>	Models oriented towards maximizing the use of a product. In this case, physical stock is not as important as ensuring that the product will be available when the consumer wants to rent it. Online platforms are especially useful for keeping track of many different items from many different users.	Sharing Platform, Product as a Service	Increase Clothing Utilization
<i>Demand Management (votes)</i>	Models that attempt to forecast what the demand for their products might be in order to eliminate unused or unpurchased products. In this case demand is forecasted by surveying the public or a group of consumers to see what their needs are.	Circular Supply-chain	Make effective use of resources and move to renewable inputs
<i>Demand Management (sales and data)</i>	Models that attempt to forecast what the demand for their products might be in order to eliminate unused or unpurchased products. In this case, companies use technology and data, like previous sales and customer information, to predict what demand will be.	Circular Supply-chain	Make effective use of resources and move to renewable inputs
<i>Co-creation</i>	Models that allow customers to have a hand in the design of a product. These products are made-to-order and in this case the product is sold before it is produced, preventing excess waste and changing mass production to mass customization.	Circular Supply-chain	Make effective use of resources and move to renewable inputs

Source: Own elaboration based on Circle Economy (2015)

The 10 circular textile models mentioned above are not quick fixes for the complex issue that is the environmental and social impact of the current textile industry. That said, the strategies that pertain to each of the models can certainly be applied to many types of businesses within the global textile supply chain. Various aspects of these models can be combined to create new textile models that not only efficiently use resources but limit the other, many negative externalities that are associated with the garment industry.

It is important to note that the application of circular business models to the textile industry in the EU will not immediately transform the industry into a circular one. Businesses, policy makers (governments), nonprofits, and the citizens of the world will all need to contribute to the facilitation of this large-scale systemic change. In Figure 7, many of the necessary components for a circular textiles economy are mapped out, from the pillars of the CE and the business models that can be used for policy options to behavioral and education changes for the public and, in effect, the consumer.

Figure 7: The role of circular business models, policy options, education, and behavioral change in circular textiles systems



Source: (European Environment Agency, 2019)

After explaining the methodology of this project in the next section, five real-world businesses will be analyzed along with their circular textile strategies according to each of the 5 CE models offered by Lacy and Rutqvist in the Case Studies section.

3. Methodology

In order to put together a document that would be both informative to the average consumer and practical for the present and future textile entrepreneur, many different references and various methodological strategies have been utilized.

The present document can be likened to a funnel, where the information offered in the early sections is quite general, and as the reader moves along through the document the topics brought up become more specific. By first providing a brief historical background of industry and the overarching focuses of business, the reader is presented with potential social, economic and, above all, environmental failings of industry in the traditional sense.

Then, the concept of the Circular Economy is brought forth as a potential solution not only to the environmental and social drawbacks of an acute focus on short-term profit maximization, but also as a way to increase the economic gains of businesses simultaneously. In this section, the origins of the CE are explained, and then certain circular frameworks are mentioned. Specifically, the ReSOLVE Framework presents multiple strategies for approaching production and design. Later, 'R Frameworks,' specifically the 3R and 10R Frameworks, are shown as a way of providing additional strategies to retain material value throughout a product's useful life not only for businesses and producers, but also for the individual consumer. The idea of possible circular business models is presented in general terms and then five specific circular business models are proposed, again stressing the potentially huge economic value that can be saved by aiming to eliminate waste creation.

The focus of the document then shifts specifically to the textile industry, one that is identified as a particularly wasteful one, making it a feasible target for implementing circular business models and thinking. Here, a series of textile-specific circular business models are identified. Five successful European companies within the textile industry that vary in size and core business activities are analyzed as real-world examples of the five circular business models mentioned earlier in the document. A brief history of each company is provided, and their strategies are assessed using the Business Model Canvas, a widely used method of analyzing a company's business model and core business activities.

Finally, considering all the strategies, business models, and specific company examples in the previous parts of the document, "The Entrepreneur's Guide to Circular Textiles" is presented. This guide, to be used by actual entrepreneurs within the textiles industry, lays out 14 'roadmaps' that, through a series of yes/no questions, are meant to facilitate decision making for the entrepreneur when considering the 9 aspects of their company's business model that are outlined by the Business Model Canvas.

Visual graphics and organized tables are included throughout the document to clarify the message to the reader and offer information not only through text. Whenever possible, the information used was collected from trusted academic journals and other respected sources, like books that have been instrumental in shaping circular thinking in the past few decades.

4. Case Studies

The following cases are modern examples of European companies that use circular textile strategies to make a positive impact on the environment. They have all found innovative ways to incorporate circular techniques into their business models and are economically viable. The cases can be used to represent the 5 circular business models offered by Lacy and Rutqvist in “Waste to Wealth: The Circular Economy Advantage”: Circular Supply Chain, Recovery and Recycling, Product Life Extension, Sharing Platform, and Product as a Service.

While these cases were chosen to represent the five models, it should become clear that no case is only applicable to one of these models, and in some cases the companies have applied strategies that can be categorized by all 5 of the models. As mentioned, circular strategies are not mutually exclusive, and oftentimes actually facilitate the application of additional circular strategies. It is also true that all of the businesses analyzed are of a certain size and dimension that is unlikely of a startup. Notwithstanding, the strategies used can be applied by an entrepreneur to any business, regardless of size.

For organizational purposes and ease of analyses, each company will be introduced and then a Business Model Canvas will be presented, outlining many components of each company’s business activities. The Business Model Canvas has been chosen because of the way it effectively breaks down a company’s business model into its various aspects: Key partners, activities, and resources, value propositions, distribution channels, customer segments and relationships, cost structure, and revenue streams. A blank canvas is offered in Figure 8 below for reference. After the fifth and final case is presented, “The Entrepreneur’s Guide to Circular Textiles” is proposed.

Figure 8: Blank Business Model Canvas, to be used for cases

Model #: Business Model Name		Company Name		
Headquarters:				
Key Partners:	Key Activities:	Value Propositions:	Customer Relationships:	Customer Segments:
	Key Resources:		Channels:	
Cost Structure:		Revenue Streams:		

Source: Own elaboration based on Osterwalder & Pigneur (2010)

4.1. Case #1 – Circular Supply Chain: Ecoalf

Ecoalf is a garment producer based in Madrid, Spain whose mantra “Because there is no planet B” sums up the reasoning behind their sustainable business operations, which seek to have a positive impact along the entire textile supply chain. The company’s main value proposition lies in its use of recovered materials, especially plastics recovered from the sea, and its ability to process them into threads that are then used to make high-quality clothing. Their innovative technology and partnerships have facilitated the creation of more than 400 recycled fabrics with the same characteristics and quality as non-recycled material, and with a much lower environmental footprint. Ecoalf doesn’t just provide high-quality, durable clothing that can be reused or recycled into new garments when the consumer is finished with them, but one of their procurement processes for raw materials simultaneously removes plastic and other debris from the seas (Ecoalf, 2021c).

This project, “Upcycling the Oceans” (UTO), started on Spanish coasts in 2015 and was expanded to Thailand in 2017 and Greece and Italy in 2020 (Ecoalf, 2021c). Through the Fundación Ecoalf, the company has partnered with various municipal governments, tourist agencies, private companies, and fishermen in small ports in order to facilitate the initiative.

The UTO campaign has three main objectives: eliminate ocean waste that is harmful to underwater ecosystems, give that waste a second life by recycling it into durable, quality clothing, and raise awareness about the ever-increasing problem that is waste in our oceans (Ecoalf, 2021c).

By partnering with local fishermen in coastal towns, the Spanish pilot project has gained quite a bit of steam in just over five years, now operating in more than forty ports along the Iberian coastline and involving almost 600 boats and more than 2,500 fishermen. By incentivizing the recovery of materials and working hand in hand with key partners, such as the local fisheries, the project has extracted a collective 600+ tons of waste from the Mediterranean Sea since its inception (Ecoalf, 2021b). The amount (in tons) of trash per year is outlined in Figure 9.

Figure 9: Tons of marine trash removed annually by the Upcycling the Oceans campaign, as well as participating ports, boats, and fishermen by number (2015 – 2020)

	2015	2016	2017	2018	2019	2020
BASURA MARINA (T)	23	54	113	140	152	180
PUERTOS	9	9	32	37	40	40
BARCOS*	165	165	462	546	550	573
PESCADORES*	743	743	2079	2534	2600	2575

* La flota de arrastre representa el 96% de los participantes del proyecto.

Source: Ecoalf (2021d)

The business's operations for the UTO campaign are split into four distinct key activities: recovery of waste, separation by material, recycling and breaking down of material, and processing materials into threads to later be used in garment production. Certain materials can be processed faster than others, like PETs (a common type of plastic bottle), which are quickly recycled into flakes and pellets and then converted into entirely recycled polyester threads (Ecoalf, 2021c). While Ecoalf's target recovery material is PET bottles due to its enhanced recyclability (McDonough & Braungart, 2002), they are able to process many different types of materials: polyester, nylon, cotton, wool and rubber in the form of used tires (Ecoalf, 2021a). Through this project, Ecoalf doesn't just keep their own material loops closed, they are closing loops that were left open after 'disposal' of unwanted materials.











Although the company is making a real impact, they still face many challenges. Maybe the biggest challenge is that the waste collected is extremely varied, and oftentimes even the same materials must be treated differently based on the amount of time they were exposed to water, salt, and sunlight (Ecoalf, 2021c). For this reason, Ecoalf is investing heavily in research and development to be able to sort and recycle the materials so that they can upcycle the trash into valuable garments.

While Ecoalf now has a presence throughout the greater Mediterranean after expanding the UTO project to Italian and Greek coasts, they have also targeted Thailand as a stepping stone into Asia. Of some 8 million tons of trash that wind up in our oceans annually, 60% come from Asian countries, meaning there is much potential in Asian waters for initiatives that focus on removing waste from the sea and using it as raw materials (Ecoalf, 2021e).

While not all Ecoalf's fabrics are recycled, they are all sustainable in terms of source and recyclability. They prefer to use recycled materials because processing requires less energy and water and produces less CO2 emissions, not to mention the positive environmental impact generated by removing garbage from the ocean. The company's founder and president, Javier Goyeneche, highlighted the company's opportunity to capitalize on using recycled materials, stating that to make nylon thread from oil, 17 chemical processes are required, whereas making the same thread from recovered nylon fishing nets can be done in just 7 steps (Olivares, 2018).

For transparency purposes, Ecoalf is a GRS (Global Recycling Standard) certified brand, which verifies that their fabrics come from recycled sources (Ecoalf, 2021a). For their dedication to the environment and their innovative processes, Ecoalf was the first Spanish fashion brand to receive the B Corp certification, meaning that they meet the highest standard of balancing purpose and profit through social and environmental action and transparency (Olivares, 2018) (Certified B Corporation, 2021).

Ecoalf's Fall 2020 collection was made up of 75% recycled fabrics and they are consistently finding new ways to increase this percentage, which ultimately benefits them with reduced costs and the environment with reduced emissions and water usage (Ecoalf, 2021a). The company continues to be a shining example in the European textile industry of the environmental and economic advantages of upcycling, closing material loops, and extending the life of products and materials (or giving them entirely new lives). All in all, Ecoalf's goal is not to become the best company in the world, but the best company for the world (Ecoalf, 2021a).

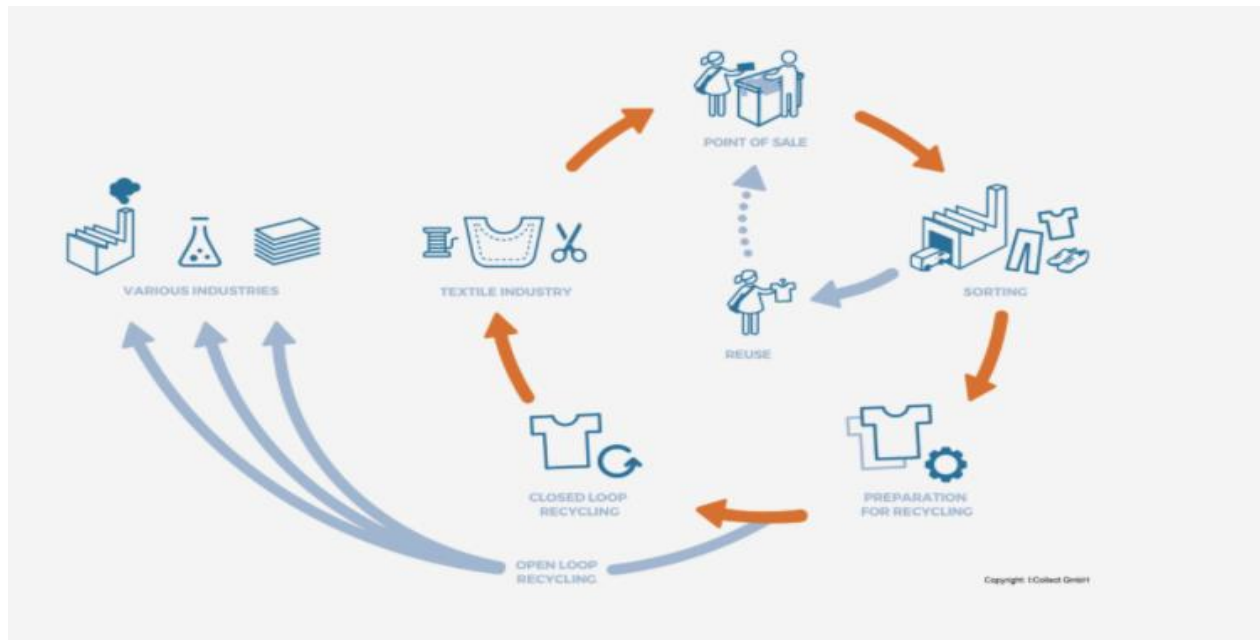
Model 1: Circular Supply Chain Headquarters: Madrid, Spain				
Key Partners: <ul style="list-style-type: none"> - Public entities: Local and municipal governments, Tourism Authority of Thailand - Nonprofits: Fundación Ecoalf, Ecoembes - Private companies: majority stakeholder Manor Group, fishing charters (and their employees), Generali, PTT Global Chemical, El Corte Inglés 	Key Activities: <ul style="list-style-type: none"> - Upcycling The Oceans campaign - 4 step process: collect, sort, recycle (pellets to fiber), produce fabric - Proposal #actnow - 'Because there is no Planet B' movement 	Value Propositions: <ul style="list-style-type: none"> - Offer durable, quality, and fashionable clothing made from recycled materials - Waste removal from the ocean - Raise awareness about health of marine ecosystems - Closed-loop production process - High level of transparency - Certified B Corp 	Customer Relationships: <ul style="list-style-type: none"> - Good standing with customers and beyond due to commitment to the environment - Provides quality clothing to those that buy their garments 	Customer Segments: <ul style="list-style-type: none"> - Environmentally aware consumer in more than 15 countries - Upper to middle class consumer based on clothing prices 
	Key Resources: <ul style="list-style-type: none"> - Recovered PET and nylon from the ocean - Recycled cotton, wool, tires, polyester - Recycling plants and machinery 		Channels: <ul style="list-style-type: none"> - Brick and mortar store locations - Outlet store - Third-party points of sale - Online marketplace 	
Cost Structure: <ul style="list-style-type: none"> - Fixed costs <ul style="list-style-type: none"> o Company-owned stores o Labor o Agreements to sell through other entities - Variable costs: <ul style="list-style-type: none"> o Material recovery and processing o Clothing production 		Revenue Streams: <ul style="list-style-type: none"> - Clothing sales online and in-store 		

4.2. Case #2 – Recovery and Recycling: I:CO

German-based textile collection company SOEX, formerly known as European Recycling Company, has been a pioneer in collecting and recycling used clothing in Europe and around the world for more than five decades (SOEX, 2021a). In 2009, the group started a new initiative called I:Collect (I:CO for short), with the main goal of diverting shoes and clothes from landfills at the end of their useful lives by collecting items in-store that would otherwise be discarded (I:CO, 2021d). According to I:CO, 150 million tons of clothing and shoes are sold annually, and the majority of it ends up in landfills or are incinerated, simultaneously wasting valuable materials and harming the environment (I:CO, 2021d). I:CO focuses on collecting as much material as it can and, in accordance with the waste hierarchies, reusing items that are still intact and recycling those that aren't (I:CO, 2021a).

All clothing recovered from the I:CO in-store collection bins follows the same process: delivery, sorting, categorizing, shredding, and compacting. All clothes collected in Europe find their way back to SOEX's massive processing plant in Wolfen, Germany through the company's advanced logistics network. At the plant, clothes are sorted from any non-textile items that may have ended up in the collection bins and are then categorized by type of garment, material, quality, and style. Clothes that are in good enough condition to be used, some 55%, are resold to buyers in developing markets, usually in Africa or Eastern Europe (Woo, 2017). Those that are in poor condition continue on to be shredded and then are sold to various industries depending on their needs. Roughly shredded textiles can be sold for insulation to buyers in the automotive industry, while finely shredded fabrics can later be re-spun with virgin threads to become partially recycled fabrics (Woo, 2017). I:CO's relationship with the textile loop can be seen in Figure 10, which shows how the company closes material loops through reincorporation.

Figure 10: I:CO Material Loop



Source: I:CO (2021c)











This loop is unique because of its starting point: point of sale and geographically diverse recollection containers. In this case, disposal for the consumer takes the form of recollection on the part of I:CO. Through I:CO, SOEX boasts more than 30,000 collection containers, 7,000 of which are placed in stores where clothes are sold, in more than 65 countries around the globe (Woo, 2017). While the collection bins all take the same physical form, their design is catered to each individual brand (SOEX, 2021a).

Currently the company works with more than 50 brands, including H&M, Levi's, Calzedonia and Adidas (I:CO, 2021e). I:CO not only offers brands a way to pass value along to their customers by giving them a chance to divert unused clothing from landfills, but they also pay the brands per kilogram of clothing that is collected (Circle Economy, 2015). Additionally, I:CO donates 2 euro cents to charitable organizations for every kilo collected at H&M stores (Circle Economy, 2015). The company is economically viable because they later can sell reusable garments and reprocess those that can no longer be used and because they form part of the SOEX Group, which already has vast logistics networks in place around the globe.

While SOEX has always been involved in textile recovery and recycling, the I:CO initiative allows the various brands to empower their consumers by placing the collection bins in the same place

that clothes are sold, highlighting the fact that they are consciously aware of the environmental issues that are rooted in fast fashion principles and improper disposal of valuable materials. The different brands that use I:CO's collection bins sometimes even offer purchasing vouchers as an incentive to recycle purchased garments when the consumer is finished with them (SOEX, 2021b). For example, when a consumer brings in 5 or more garments to GUESS stores in the US, they receive 15% off their next purchase at that same store (I:CO, 2021b).

All in all, I:CO creates value for themselves, the brands they work with, and the customers of those brands by capitalizing on textile materials and fabrics that would otherwise have gone to landfills while providing incentives to other stakeholders in the textile industry at the company and individual levels.

Model 2: Recovery and Recycling Headquarters: Ahrensburg, Germany				
Key Partners: <ul style="list-style-type: none"> - More than 60 brands that take part in the collection bin system, including H&M, The North Face, Levi's, and Adidas - Customers of partner brands that provide the used clothing - SOEX Group (parent company) and their large logistics network - Charities that receive the per-kilogram donations 	Key Activities: <ul style="list-style-type: none"> - Collection of used garments through collection bin system - Shipment of collected clothing to designated processing plants, where they are sorted and recycled 	Value Propositions: <ul style="list-style-type: none"> - Provides brands, big and small, with a well-coordinated take-back system - Promotion of finding a second use for clothing that has already been produced - Recycling and downcycling of materials that cannot be resold or reused - Charitable donations based on amount of clothing (by kg) collected 	Customer Relationships: <ul style="list-style-type: none"> - I:CO's take-back service offers a much-needed helping hand to many brands - Entities that purchase the used clothing that is in good condition do not pay full price 	Customer Segments: <ul style="list-style-type: none"> - Many different companies, varying in size, in more than 65 countries that provide the raw materials in the form of collected clothing - Bulk resale customers, mainly in Africa and Eastern Europe - Other industry actors looking for recycled cloth and insulation 
	Key Resources: <ul style="list-style-type: none"> - Brand partners - Logistics network - Collected clothing - Recycling technology and vertical integration into SOEX Group 		Channels: <ul style="list-style-type: none"> - Collection bins that are placed at point-of-sale and in public spaces - Resale to developing markets and other industries after downcycling 	
Cost Structure: <ul style="list-style-type: none"> - Fixed costs: <ul style="list-style-type: none"> o Facility costs o Labor costs - Variable costs: <ul style="list-style-type: none"> o Price/kg paid to brands for collected clothing o Small donation for every kg collected o Delivery costs 		Revenue Streams: <ul style="list-style-type: none"> - Clothing resale for garments that are still in good condition - Shredded fabric that is downcycled is resold to other industries for various purposes - Finely shredded fabric that is re-spun with virgin fibers is resold as recycled fabric 		

4.3. Case #3 – Product Life Extension: Nudie Jeans

European denim producer Nudie Jeans was founded in 2001 in Gothenburg, Sweden and has since expanded across Europe and to three other continents: North America, Australia, and Asia. It now operates 34 store locations under the Nudie Jeans name, and all stores also serve as repair shops for existing customers (Nudie Jeans, 2021d). Additionally, the company sells its products through third-party retailers.

Since its inception, Nudie Jeans has focused heavily on sustainability all throughout its supply chain, from the cultivation, production, and processing of materials (mostly cotton) to the useful life of the product and even after the consumer is finished with them. In fact, Nudie Jeans releases an annual, detailed sustainability report outlining the materials they use in production, as well as information about their suppliers and even the working conditions of the laborers upstream in their supply chain. This level of transparency is certainly an important value proposition for the brand. The company uses its own ‘Sustainable Fibers’ index to aid in ranking and classifying potential fibers at the time of procurement or production. This index is provided in Figure 11 and the three classes are graded by their recyclability, biodegradability and whether the fiber itself is already recycled. A ‘Non-Sustainable’ and ‘Do Not Use’ fiber index can also be found in their report.

Figure 11: Sustainable Fibers Index from “The Nudie Jeans Material Tool”

Sustainable Fibers		
CLASS 1 ¹	CLASS 2 ²	CLASS 3 ³
Recycled cotton	Recycled polyester	Certified alpaca
Reused Nudie Jeans	Recycled nylon	Certified yak
Recycled wool	Certified organic cotton	Certified mohair
Traceable, organic and/or Fairtrade cotton	Certified wool	Certified organic silk
Certified organic jute	Certified organic linen	Certified and vegetable tanned leather
TENCEL™ Lyocell	Certified organic hemp	
FSC® or PEFC™ Pulp	Certified kapok	

Source: Nudie Jeans (2019)

Another core concept of the brand is its repair service offering to anyone with a Nudie Jeans product. While these repairs happen in-store (all stores double as repair shops as of 2012), if a customer is not geographically near a store or would rather not go physically, they will be sent a free repair kit containing denim patches, thread, a needle and a thimble, among other things (Circle Economy, 2015). Regardless of how the product is repaired, or by whom, one thing is certain: Nudie Jeans offers free repairs on their products...forever (Nudie Jeans, 2021b). All Nudie Jeans stores are equipped with trained staff that can efficiently repair typical wear-and-tear of denim products. Across all stores in 2019, the company repaired more than 63,000 pairs of jeans and sent out more than 2,000 repair kits (Nudie Jeans, 2019). This repair concept, while extremely useful in prolonging a product's useful life, is just one of the four aspects that make up the useful life of, say, a pair of jeans. Nudie Jeans believes that a garment such as a pair of jeans is durable, just like a person, and that signs of use tell a story the same way a scar does (Nudie Jeans, 2019). Repair is just one of four phases of a Nudie Jeans product life, and the four phases are the following: Break-in, Repair, Reuse and Recycle (Close the Loop, 2021).











The 'Break-in' phase is unique to Nudie Jeans because the denim is not washed before it is sold (referred to as dry denim) (Nudie Jeans, 2019). The purpose of this is so that the consumer wears their pair of jeans many times before washing it, and when they finally do wash it the most worn part of the jeans fade with the first wash (Close the Loop, 2021).

The repair phase implies that every pair of Nudie Jeans should be repaired at least once, if not many times, during its life. As mentioned, customers can take their ripped or over-worn jeans to any store to have them repaired or request a repair kit from afar. Nudie Jeans values people that take pride in the repeated repair or creative use of their jeans. For this reason, the brand has an "Our Story" section of their website, which serves as a blog, where they highlight customer stories and experiences with Nudie Jeans products (Nudie Jeans, 2021d).

In the reuse phase, the company further encourages circular activity by inviting customers who no longer desire their worn pair of jeans to turn them in at any Nudie Jeans Repair Shop (brand store) for a 20% discount on their next pair (Circle Economy, 2015). Those jeans that are turned in and deemed repairable will then be repaired by trained staff members and resold as refurbished pairs at a lower price. In 2019, 3,521 pairs of Reuse Jeans were sold in Nudie Jeans Repair Shops (Nudie Jeans, 2019). The material from pairs of jeans that are too worn or destroyed will be either be upcycled into smaller products, like caps or bucket hats, or downcycled into denim patches to be used for the repair kits. Otherwise, the scraps will be saved and utilized in the next recycle phase (Circle Economy, 2015).

The fourth and final stage of the life cycle process of a pair of Nudie Jeans is the recycle phase. Here, the main option for reincorporating the used denim back into the material loop is recycling unusable jeans and old denim scraps to obtain thread. Because this thread comes from used jeans, it is weaker than Nudie Jeans' preferred standard for new denim products, which is made with organic cotton. Thus, these threads are re-spun with virgin organic cotton threads to make 'recycled' pairs of jeans. The ratio used by Nudie Jeans that ensures the strength of the new fabric is about 20% recycled thread and about 80% virgin organic cotton thread (Nudie Jeans, 2019). A great example of this recycling technique in action can be found in Nudie Jeans' Rebirth Collection, a series of jeans and other denim garments made using the twenty percent recycled fibers. In 2020, Nudie Jeans began a collaboration with the United Nations Industrial Development Organization (UNIDO) with the plan of recycling 8,000 extremely worn pairs of Nudie Jeans and combining the resulting thread with virgin organic cotton in order to make 15,000 pairs of recycled jeans (Nudie Jeans, 2021a). According to Nudie Jeans and UNIDO, using just 20% recycled fibers can directly result in an equal percentage of water savings and can decrease other environmental pressures caused by virgin resource use (Nudie Jeans, 2021a).

Nudie Jeans' passion for sustainable and circular strategies clearly has an impact on their customers, and these values are reflected through the many stories and engaged Nudie Jeans consumers on their blog and social media. On Instagram, for example, Nudie Jeans' has gained more than 210,000 followers, a testament to the fact that people from all over the world are interested in the value that Nudie Jeans creates through their business. While many strategies are utilized, the overarching goal of the company is clear: create durable, quality products whose useful life can be tremendously prolonged through repair and reuse models, using recycling as an innovative way to extend the life of the materials themselves.

Model 3: Product Life Extension Headquarters: Gothenburg, Sweden				
Key Partners: <ul style="list-style-type: none"> - Supply chain partners, specifically producers in various countries - Customers committed to the repair of their products - Third party couriers that deliver repair kits - Staff across all repair stores 	Key Activities: <ul style="list-style-type: none"> - Store operations and retail activity - In store Nudie garment repairs and repair kit delivery - Environmental awareness initiatives 	Value Propositions: <ul style="list-style-type: none"> - Promotion of the life extension of products through repair, both in-store and with kits - Many certifications for products themselves and the manufacturing processes - "Right to a Living Wage" for all employees - Prioritization of reuse and recycling - Innovative techniques incorporating old products into new ones - Annual sustainability report, transparency 	Customer Relationships: <ul style="list-style-type: none"> - Free repairs, always, to all customers - Discounts for turning in used jeans and loyalty program - Customers form part of an active online community 	Customer Segments: <ul style="list-style-type: none"> - Denim lovers around the world, specifically those already using Nudie products - Environmentally aware consumers that value reutilization of valuable textile materials 
	Key Resources: <ul style="list-style-type: none"> - Production partners - Trained staff members - Customer community - Store locations - Online presence 		Channels: <ul style="list-style-type: none"> - Brick and mortar stores that serve as repair shops - Online: website, blog, and social media presence 	
Cost Structure: <ul style="list-style-type: none"> - Fixed costs: <ul style="list-style-type: none"> o Labor and training o Machinery o Production o Building and store locations - Variable costs: <ul style="list-style-type: none"> o Repairs and repair kits o Machinery maintenance 		Revenue Streams: <ul style="list-style-type: none"> - Clothing sales online and in-store as well as wholesale denim sales 		

4.4. Case #4 – Sharing Platform: **Circos**

Circos, founded in Amsterdam in 2019, is a subscription-based clothing rental company focusing on garments for target markets that are very susceptible to lack of long-term use and/or premature disposal: young children and soon-to-be mothers.

Erick Bower, founder and CEO of Circos, spent almost twenty years as a corporate pricing manager before taking a sabbatical that forced him to rethink his impact on the 3Ps associated with the Triple Bottom Line: People, Planet and Profit (Reconsidered, 2021). After having a child of his own, born larger than the average baby, he and his wife were left with heaps of infant clothing that was never going to fit (Lewis, 2021). This made him think twice about the amount of clothing for small children around the world that might only be worn a few times, if ever. After concluding that it made more sense for him to have a changing wardrobe that adapted as his child grew, he began to think that maybe he wasn't the only parent with that mentality.

Circos was developed with the purpose of prolonging the life of garments for babies and small children (up to age 4), as well as for pregnant women, by increasing the number of times those garments were worn (Circos, 2021a). By implementing a business model that allowed these people, whose physical form was constantly changing, to have access to quality clothing that's guaranteed to fit, Circos has been able to provide value for many different stakeholders across its value chain.

First and foremost, it saves precious time, space and money for parents who likely would rather be spending quality time with their small or unborn children, rather than dealing with the hassle of going shopping (Circos, 2021a). Secondly, it offers durable, quality clothing from respected brands like Adidas, Patagonia, ARKET, and its own brand, Vigga, at very reasonable prices and allows the customer the option of choosing and changing their clothes each month. By using a subscription method, the consumer pays a minimum monthly fee of 19.50 euros that can be put towards their clothing rentals, and any additional garment rentals are added on to the base price (Lewis, 2021).

To put things into perspective, a baby's full, "essential" wardrobe can be made up of 12 to 24 distinct garments, and in the first two years of a child's life it's not uncommon for them to grow out of 8 different clothing sizes (Ellen MacArthur Foundation, 2020). Some quick math would result in one baby needing 100+ garments in just 24 months of their life. So, while maybe the price doesn't initially sound cheap, when compared to the total cost of buying every baby their own garments

(only to dispose of them once they grow to the next size), it is almost surely cheaper. Some basic baby garments, like a shirt or leggings, are available on the website for about 2 euros per month, meaning that the almost 20 euro per month minimum investment could account for a good chunk of a baby's expected garment needs (Circos, 2021d). Similar logic can be used for women going through a pregnancy, who might need multiple different clothing sizes in a matter of months. Additional value is offered to the consumer when they account for the environmental impact their decision is having.











Circos aims to circulate each garment anywhere from 8 to 10 times before they are too worn for rental and are subsequently recycled to be utilized in the production of new clothes (Ellen MacArthur Foundation, 2020). The idea that the consumer is taking part in something positive that would traditionally have been part of a wasteful practice is another aspect of customer retention. Bouwer estimates that more than 70% of his customer retention does not come from a timesaving, cost-saving, or money-saving perspective, but rather from the fact that the consumer likes playing a role in sustainable business practices (Lewis, 2021). According to the EMF, Danish consultancy firm PlanMiljø was able to prove that in one month of using the Circos clothing rental subscription, the average customer was able to save 6.14 kg of carbon dioxide, 242 liters of water and 270 grams of cotton when compared to parents that buy all of their children's clothing (Ellen MacArthur Foundation, 2020).

For the business itself, it turns out that treating their garments in this manner allows them to earn higher levels of revenue from each garment, while the cost per use is lower for the consumer (Ellen MacArthur Foundation, 2020). This creates a cycle that incentivizes the production of high-quality and highly durable clothing for the brands that supply the company. Additionally, Circos provides insightful user feedback regarding specific garments to each of the brands so that they can further improve their processes and focus their efforts on articles of clothing that are particularly successful or sought after (Ellen MacArthur Foundation, 2020).

It's worth noting that Vigga, Circos' own clothing brand, has a history of sustainable activity. Started in late 2014 by Vigga Svensson, it had its own subscription model geared towards baby's clothing and had won several awards by 2016, such as "most sustainable solution in the fashion industry" and "most innovative business concept in retail trade" (Design School Kolding, 2016). The company's disruptive business model has been reflected in the new business concept, Circos, since 2019.

The Circos subscription service is available to people across almost 20 different countries within Europe and its user base continues to grow (Circos, 2021c). Garments are inspected and cleaned internally after being sent back to the company in compostable packaging, and the customer is not charged fees for normal wear and tear or things like stains on the clothing (Circos, 2021b).

While Circos was only formed in 2019, current fashion trends predict that likeminded businesses with disruptive, sustainable business models will see continued success in the years to come. In 2020, fashion resale platform thredUp suggested that online, secondhand clothing platforms could see up to almost 70% growth by 2021, while standard retail clothing sales were estimated to have shrunk by about 15% in the same period (Lewis, 2021). Vintage, secondhand clothing has been popular for years now for specific markets, after all, so there's no reason to think that this consumer habit couldn't also apply to markets that include children and maternity clothing.

Model 4: Sharing Platform – Circos Headquarters: Amsterdam, Netherlands				
Key Partners: <ul style="list-style-type: none"> - Clothing producers: Adidas, Patagonia, Vigga, ARKET - Distribution partners - Compostable packaging partner: wastebased. - Subscribers - Laundry machine and sanitation suppliers 	Key Activities: <ul style="list-style-type: none"> - Subscription service - Distribution and inventory management - Cleaning clothing after use - User data and feedback - Product investigation 	Value Propositions: <ul style="list-style-type: none"> - Promotes the reuse of highly vulnerable clothing items - Removes the stigma around secondhand or used garments - Customer does not have to worry about normal wear and tear - Subscribers can choose new items on a monthly basis - Usage data and feedback collected for clothing producers - Compostable packaging - Renting can be cheaper 	Customer Relationships: <ul style="list-style-type: none"> - Customer does not have to worry about normal wear and tear - Used clothing is a novelty - Company and consumer “in it together” 	Customer Segments: <ul style="list-style-type: none"> - Soon-to-be mothers and their spouses - Environmentally aware parents (with young children) - Parents that are not prejudiced towards used clothing - Parents on a budget 
	Key Resources: <ul style="list-style-type: none"> - Suppliers - Consumer data - User base across Europe - Internal laundry equipment 		Channels: <ul style="list-style-type: none"> - Online store 	
Cost Structure: <ul style="list-style-type: none"> - Fixed Costs: <ul style="list-style-type: none"> o Labor o Clothing - Company real estate 		Variable Costs: <ul style="list-style-type: none"> o Distribution and packaging o Administration o Laundry and cleaning o Marketing 		Revenue Streams: <ul style="list-style-type: none"> - Minimum monthly subscription fee of 19.50€ per month, plus additional monthly clothing rental prices 

4.5. Case #5 – Product as a Service: Dutch Awearness

In the 1990s, Dutchman Rien Otto was on a humanitarian trip in Ethiopia when he was first exposed to the massive amount of Western-produced clothing that ends up in landfills in developing countries (Closing the Loop, 2018). He decided to make it his goal to find a way to help solve the problem of textile waste, and especially the waste that's thrust upon third-party countries that find themselves less prepared to deal with it. For Otto, it would be fitting that the next industrial revolution begin with textiles, where the first industrial revolution began (Closing the Loop, 2018).

Fast forward to 2014 and Otto's creation, Dutch Awearness, achieved the first fully circular supply chain in the textile industry with its 'Returnity' fabric. This fabric, made from 100% polyester threads, was able to be recycled many times over and, as the old garments are used as inputs, raw material demand was cut by 61% (European Commission, 2014b). Dutch Awearness was able to develop its fabric and business model with the help of the EcoProFabrics program, a two-year pilot project through the European Commission's Eco Innovation program. Beginning in 2014, more than 2 million euros were delegated to companies that found environmentally friendly alternatives to textile production (European Commission, 2014).

While many advancements have been made in terms of fabrics used and recycling technology since 2014, Dutch Awearness' plan has remained the same: offer high quality, reusable clothing items, whose materials can be tracked and traced throughout the entire supply chain, in the form of performance-based contracts over a period of time (Circle Economy, 2015). The company no longer produces the Returnity fabric, which it had the license to produce for a set duration, but over a period of 18 months developed its 'Infinity' fabric, made from recycled polyester, through collaboration with German-based textile production company Becker Tuche (Closing the Loop, 2018). This is the fabric that now powers the company's operations in garment production.

Dutch Awearness provides value in many ways to a varied customer base. First and foremost, they produce circular workwear for entire workforces using the Infinity fabric that they co-created. This workwear is provided through collaboration with Tricorp, a Dutch workwear distribution company, and takes different forms that can be applied to diverse industries: construction, aviation, and medicine, among others. In the circular workwear market, Dutch Awearness does not sell the actual clothing items but sells the performance of their workwear garments. This means that companies can essentially rent the clothing necessary for any size of workforce according to their needs and specifications. Payment for these garments will happen over time

as agreed upon through specialized contracts (European Commission, 2014). When the contract expires or if a clothing item is no longer performing (i.e., it is damaged), Dutch Awearness will reclaim their materials and recycle them into fibers that can be used once again for a future contract. When compared to using virgin cotton for garment production, the recycling of used polyester into granules and then processing of it into a filament (that can be woven into threads and fabrics) has allowed collaborators to use up to 95% less water, 64% less energy and produce almost 75% less carbon emissions (Earley, 2014).











Additionally, through their subsidiary WearEver, a circular suit production company also based in the Netherlands, Dutch Awearness provides the individual customer the opportunity to purchase a 'circular' suit that uses the Infinity fabric (WearEver, 2018). When compared to wool, polyester is a much more durable textile source and when designed correctly can be of very high quality as well. The WearEver suits produced with Infinity fabric can be recycled and remade up to 8 times before the thread quality no longer lives up to the company's standards.

Through another collaboration with one of the 10 largest construction companies in Holland, Dura Vermeer, Dutch Awearness has gone even further in finding ways to utilize unwearable garments as well as pre- and post-consumer textile scraps under the third-party brand name Cliff (Closing the Loop, 2018). By combining about 50% used garments at the end of their useful life and about 50% used plastics, the companies have co-developed a composite material that has many possibilities in the world of construction, furniture and other industries that make plastic products (Dutch Awearness, 2018). Things like weather-proof furniture, office supplies, picnic tables and plastic trays are just a few examples of items that the collaboration between Dura Vermeer and Dutch Awearness has brought to fruition. This work involving the collection of industrial waste for production elsewhere, also known as urban mining, can have a real and lasting impact on cities all over the world and is a viable solution to excess waste caused by industry (Closing the Loop, 2018).

Finally, Dutch Awearness provides value to their customers by being extremely transparent across the entire supply and production of their products. Through its online software tool known as the Circular Content Management System (CCMS), all actors across the supply chain are connected digitally. At each step in the supply chain that the product or material goes through, a code is created and uploaded to the system that links it to the previous code, thus the previous step in the supply chain. This allows the final consumer to scan the QR code that is printed on the tag of their product, which then leads them to a visual representation of the various steps of

the supply chain, including materials used, geographic location and relevant certifications. A product route can even be seen using Google Maps from start to finish (Furlong, 2017).

By offering circular workwear as a service to businesses big and small, Dutch Awearness maintains the materials used in textile production within a closed loop. They also provide value to the individual through their various suit offerings with WearEver. The recycling technology utilized by the company and the other, innovative ways that they reincorporate waste into the material loop, coupled with an emphasis on collaboration and extreme transparency across the entire supply chain, has granted Dutch Awearness a position at the forefron of the European circular textile industry.

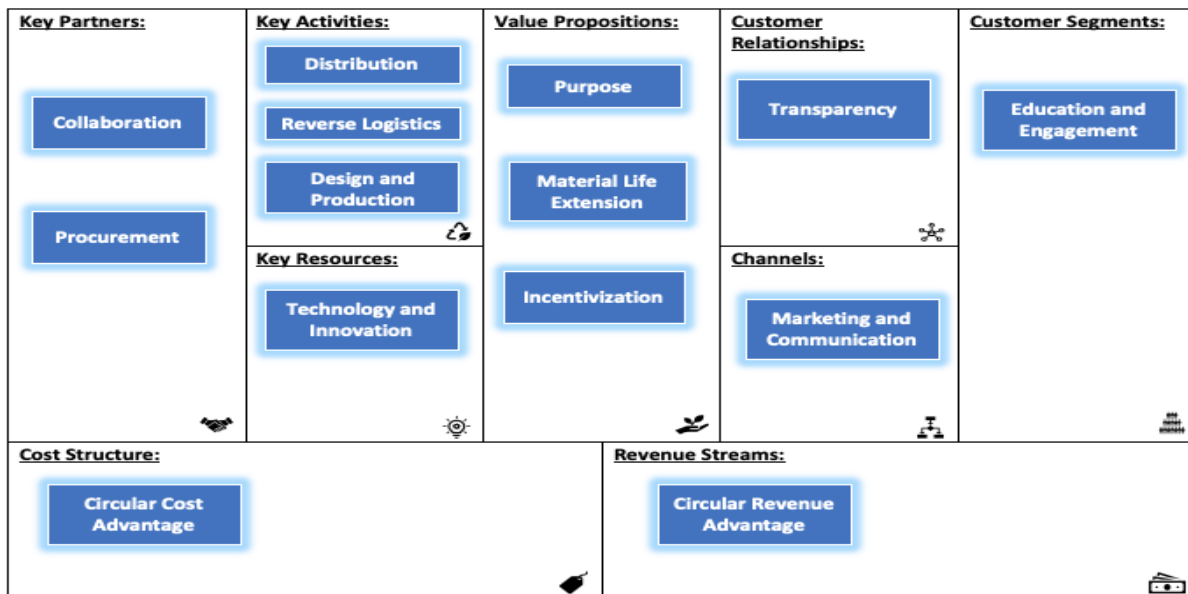
Model 5: Product as a Service Headquarters: Nijmegen, Netherlands		 DUTCH AWEARNNESS <small>pioneer in circular chain management</small>		
Key Partners: <ul style="list-style-type: none"> - Brands that contract Dutch Awearness for workwear and retailers - WearEver suit company - Becker Tuche and other textile chain partners involved in production - Resell partners - Logistics partners, including those involved in track and trace technology (CCMS) - Dura Vermeer for Cliff composite brand - Applied Polymer Innovations Institute 	Key Activities: <ul style="list-style-type: none"> - Clothing sales and take back at the end of the contract - Development of fibers with partners - Marketing and reaching new audiences - Recycling fibers 	Value Propositions: <ul style="list-style-type: none"> - Offers extremely durable workwear for entire workforces as well as individual garments - Covers workwear for companies for a set period of time - Clothing can be reused or recycled many times over without compromising quality - Decreased water and energy usage, lower carbon emissions - Innovative techniques using textile waste 	Customer Relationships: <ul style="list-style-type: none"> - DA supplies 'no frills' clothing that is durable and safe 	Customer Segments: <ul style="list-style-type: none"> - Companies with manual workforces: construction workers, medical staff, flight attendants, etc. - Individuals interested in circular suits - Construction and furniture companies looking to use Cliff composite material 
	Key Resources: <ul style="list-style-type: none"> - Partner network and collaborators - Track and trace technology (CCMS) - Infinity fabric 		Channels: <ul style="list-style-type: none"> - Online 	
Cost Structure: <ul style="list-style-type: none"> - Fixed costs: <ul style="list-style-type: none"> o Facility costs o Track and trace software - Variable costs: <ul style="list-style-type: none"> o Distribution o Clothing recollection o 'Recycling' 		Revenue Streams: <ul style="list-style-type: none"> - Workwear clothing supply contracts made online for set periods of time, which spreads out revenue - Individual purchases from WearEver brand - Sales from Cliff products 		

5. The Entrepreneur’s Guide to Circular Textiles

After surveying the market of European textile companies and analyzing select examples of those that satisfy at least the basic components of each of the five circular business models offered by Lacy and Rutqvist, a few important takeaways can be identified that will ultimately help offer guidance to entrepreneurs that either already form part of textile companies or are thinking of starting their own business. These takeaways are outlined in the following pages, which will then be used as the basis of “The Entrepreneur’s Guide to Circular Textiles.”

In order to offer insight that serves an entrepreneur within the textile industry, a series of points of emphasis will be mentioned in Table 9 explained in general, strategic terms, after which examples from the 5 case studies will be provided. These focal points are then linked to a specific component or components of the Business Model Canvas to facilitate the next section, “The Entrepreneur’s Guide to Circular Textiles.” A blank Business Model Canvas is provided in Figure 12 with the corresponding focal points for each of the 9 components. Some components will have multiple focal points, however it is important to note that most, if not all, of the focal points are related to multiple components of the Business Model Canvas. Figure 12 is followed directly by the Table 9.

Figure 12: Focal Points as they relate to the Business Model Canvas



Source: Own elaboration

Table 9: Explanation of Focal points for The Entrepreneur's Guide to Circular Textiles

Key Partners		
Emphasis:	Explanation:	Example(s):
Collaboration	By creating meaningful, strategic partnerships with other organizations, knowledge can be shared, and barriers related to innovation or resources can be overcome. These collaborations should be beneficial to both parties.	<ul style="list-style-type: none"> - Dutch Awearness partners with large textile producers as well as a scientific institute to research recyclable fabrics and then put them into practice - Ecoalf collaborates with fishermen and municipalities, making the sea in those areas a cleaner place and getting material inputs simultaneously - I:CO partners with brands, offering value through their takeback service and in turn receive cheap materials - Nudie Jeans partners with certified suppliers, adding value to their products. They then invest in the workers that form part of their supplier networks - Circos partners with clothing brands that provide quality, durable materials and later gives them feedback at the end of the material's life
Procurement	Two of the most important factors when considering the environmental impact of any product are the materials used to make the product, which has many implications later in the product's life, and how the materials for the product were created or extracted. Inputs that are considered circular are those that can be reincorporated into the biosphere (biological nutrients) and those that can be reincorporated into industry (technical nutrients).	<ul style="list-style-type: none"> - I:CO's procurement source comes directly from what would have been the end of a linear material model: consumer waste - Ecoalf's has found ways to use PET bottles collected from the sea as inputs for certain fabrics - Nudie Jeans has strict internal regulations regarding the standards their suppliers must meet - Dutch Awearness, in collaboration with Becker Tuche, has developed a reusable thread, meaning just by collecting their old products they will be able to produce new ones
Key Activities		
Design and Production	How the product is designed will go hand in hand with its production and its impact at the end of the material's useful life. For every product that's designed to become a technical or biological nutrient at the end of its life, the associated material loop can be closed.	<ul style="list-style-type: none"> - Dutch Awearness fabric could be considered a permanent technical nutrient - I:CO converts unsellable garments into technical nutrients - Circos uses compostable packaging to send their items, which is a biological nutrient

<p>Distribution and Reverse Logistics</p>	<p>Aside from the product itself, it's important that companies consider the environmental impact of the other aspects of their normal business activities. Methods of transportation used to deliver products and materials, as well as the packaging in which it's delivered, need to be included in the product's overall impact. In the event a company recollects their products after their useful life, additional transportation used for reverse logistics should also be included.</p>	<ul style="list-style-type: none"> - I:CO uses existing transportation networks to collect for their brand partners - Circos' use of compostable packaging - Nudie Jeans only sends envelope-sized repair kits, and will not accept jeans sent via mail to be repaired
<p>Key Resources</p>		
<p>Technology and Innovation</p>	<p>By harnessing the power of modern technology, brands can create innovative material inputs as well as new processes that facilitate the repairability and reusability of those same inputs. This also allows companies to process large amount of information and collaborate easier regardless of geographic constraints.</p>	<ul style="list-style-type: none"> - Dutch Awearness's 'Infinity Fiber' and Cliff composite for construction and furniture - I:CO's vast logistics network - Ecoalf turning recovered waste into quality, fashionable garments
<p>Value Proposition</p>		
<p>Purpose</p>	<p>First and foremost, a company must be clear about the impact it wants to make and has to put the pieces into place to make that impact. Whether environmental or social, the purpose should drive the company's decision-making.</p>	<ul style="list-style-type: none"> - Ecoalf's goal to become the best company <i>for</i> the planet - Circos' protection of vulnerable material markets - Dutch Awearness collaborating to create an infinitely reusable fabric - I:CO diverting valuable garments from landfills - Nudie Jeans' belief that a pair of jeans' wear and tear should tell a story
<p>Material Life Extension</p>	<p>Any time a product is disposed of prematurely, material value is lost. By implementing strategies that allow reuse, recovery and recycling, companies can prolong the period of use of a product and thus extend the useful life of the materials.</p>	<ul style="list-style-type: none"> - Circos reaching new customers with the same garments - Ecoalf closing material loops by recovering waste from the ocean - I:CO diverting garments from landfills by offering brand partners takeback bins - Dutch Awearness incorporating reusable materials from the design phase - Nudie Jeans focusing on repairing damaged, but not destroyed, products
<p>Incentivization</p>	<p>By rewarding customers for behavior that makes a company's effort towards achieving its purpose easier, both consumer and business can see economic savings. This also serves as a manner in which companies can better their brand image and develop a lasting relationship with customers.</p>	<ul style="list-style-type: none"> - Nudie Jeans offers discounts to customers who bring in damaged jeans that they no longer want or need - I:CO offers their customers, clothing brands, a way to offer value to their own customers. The more used clothing they take in, the more they donate to charity

Customer Relationships		
<p>Transparency</p>	<p>Honesty should be at the forefront of any circular business's customer relationship strategy. By being straightforward with the customer about the origins of products and the materials, as well as the way in which those materials were extracted and the laborers treated, the company is able to build trust and credibility, which in turn sets the tone for a long-term relationship between business and consumer. In reference to the supply chain, this also applies to the company's relationships upstream with suppliers, distributors, etc.</p>	<ul style="list-style-type: none"> - Nudie Jeans releases an annual sustainability report, outlining the procurement of their raw materials (mainly cotton) and the various certifications that their suppliers hold. This includes their suppliers' labor practices - Ecoalf, as Spain's first fashion brand to become a B Corp, is held to a higher standard in terms of providing transparent information to partners and clients - I:CO guarantees that their clients' recollected goods are only resold or exported to countries that are not at risk to compete with their existing sales channels
Customer Segments		
<p>Education and Engagement</p>	<p>When a company has strong values related to their purpose and goal to make a positive impact, it makes sense that they would want to inform customers and non-customers why they decided to act through the company and its products. Offering access to accurate information not only makes the public more aware about environmental and social issues but inspires individuals to get involved with a cause they deem important.</p>	<ul style="list-style-type: none"> - Ecoalf's website is riddled with information about how much waste ends up in the sea and has events for people that want to get involved - I:CO's website is dedicated to solutions that can decrease waste within the textile industry - Circos provides info about their specific market and how it is traditionally very wasteful, even by textile standards
Channels		
<p>Marketing and Communication</p>	<p>While this point goes hand in hand with transparency, it is the company's opportunity to promote the real impact that they are making. Any claims should be supported and proven by data and verified by third parties. This information can be provided online, in videos or interviews, or on the actual product.</p>	<ul style="list-style-type: none"> - Ecoalf's website shows how much waste they have removed from the ocean. In addition, the patch on their down jackets shows how many PET bottles went into making the product - Circos website and interview with CEO Erick Bower - Dutch Awearness featured in 'Closing the Loop' documentary

Cost Structure		
Circular Cost Advantage	<p>Through some combination of circular strategies, companies can find ways to reduce their costs, especially when it comes to material inputs. When companies find innovative ways to recycle, repair and reuse raw materials, they can achieve lower input costs in the long-term. Collaboration is a crucial part of this step.</p>	<ul style="list-style-type: none"> - Ecoalf reduces processing costs because materials have already been processed - I:CO offers value to their partners through take back systems, and in turn acquire large quantities of materials for much cheaper - By reusing product materials until they are no longer useful, Circos reduces marginal costs with each additional use - After what likely supposes a large initial R&D investment, Dutch Awareness can reuse the same inputs repeatedly
Revenue Streams		
Circular Revenue Advantage	<p>Contrarily, when companies incorporate circular strategies and make sure to communicate their impact, their products intrinsically have more value. As seen in multiple reports, nowadays consumers, especially younger generations, are increasingly likely to pay more for proven, sustainable products. It's also possible that somebody who identifies with a company's purpose would be willing to pay more for their products. Additionally, when product materials are conserved, allowing them to reach more customers, more sales can occur from the same quantity of materials</p>	<ul style="list-style-type: none"> - Ecoalf pushes it sustainable culture, allowing them to charge more for their products - I:CO resells the highest quality clothing that they collect from their brand partners - Circos' ability to sell access to the garments that they own allows them to create more revenue than just selling the garment itself one time

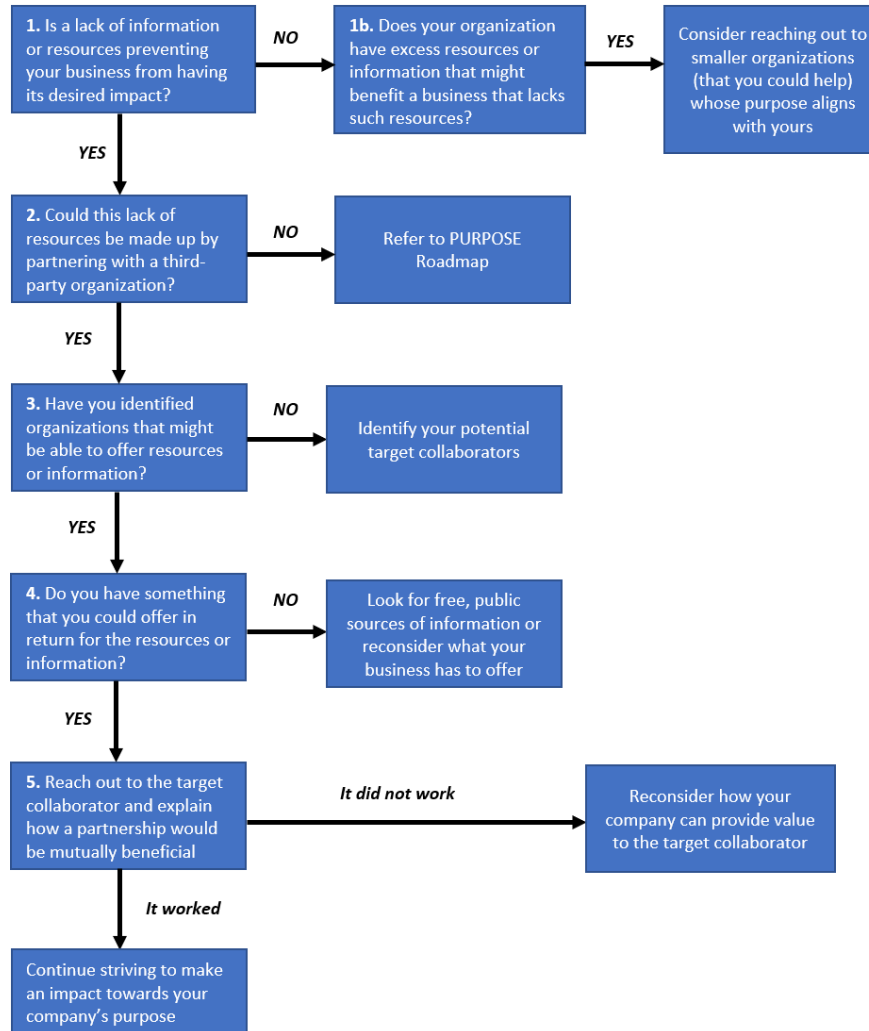
Source: Own elaboration

Next, a roadmap made up of questions is put forth for each of the distinct components of the Business Model Canvas, with the goal of incorporating not only the points of emphasis from the textile cases but also the other circular business strategies previously mentioned throughout the course of this document.

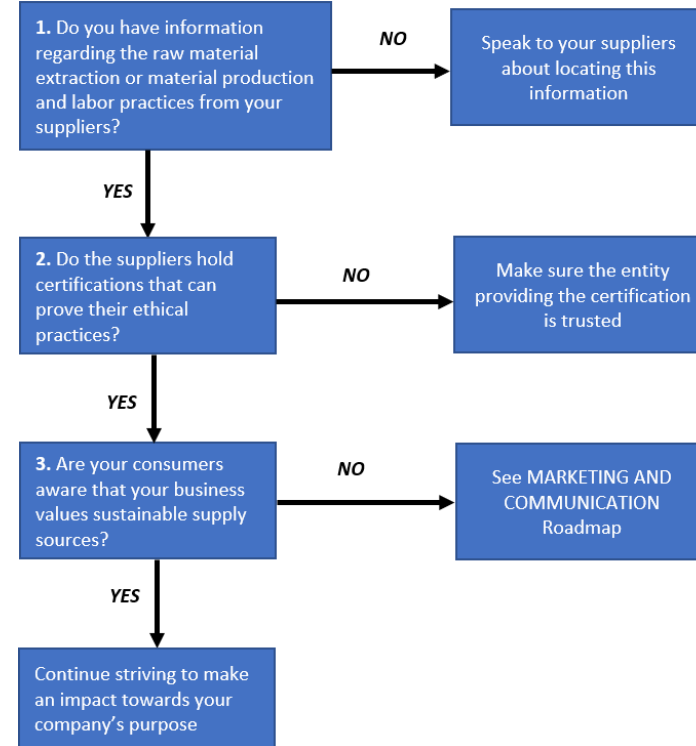
The main objective of these roadmap exercises is to guide the entrepreneur through a series of thoughts that that will allow them to consider the potential environmental impact that is associated with a textile company. By prompting the entrepreneur to think about this impact, it is hoped that future negative externalities can be mitigated through the implementation of circular business strategies.

Key Partners:

Collaboration Roadmap:

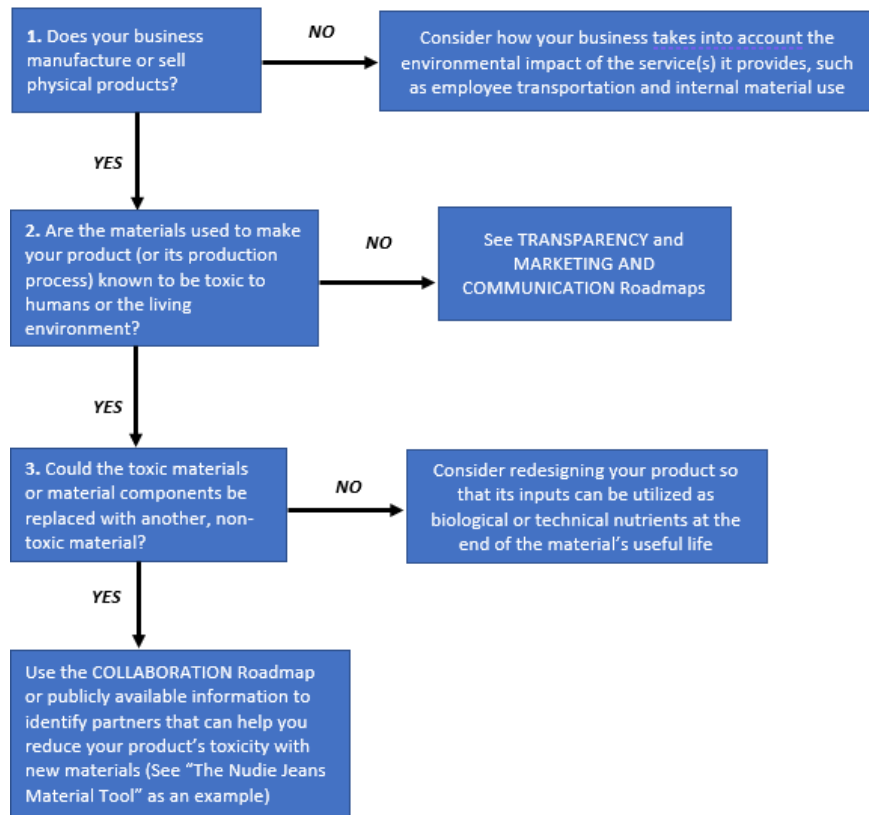


Procurement Roadmap:

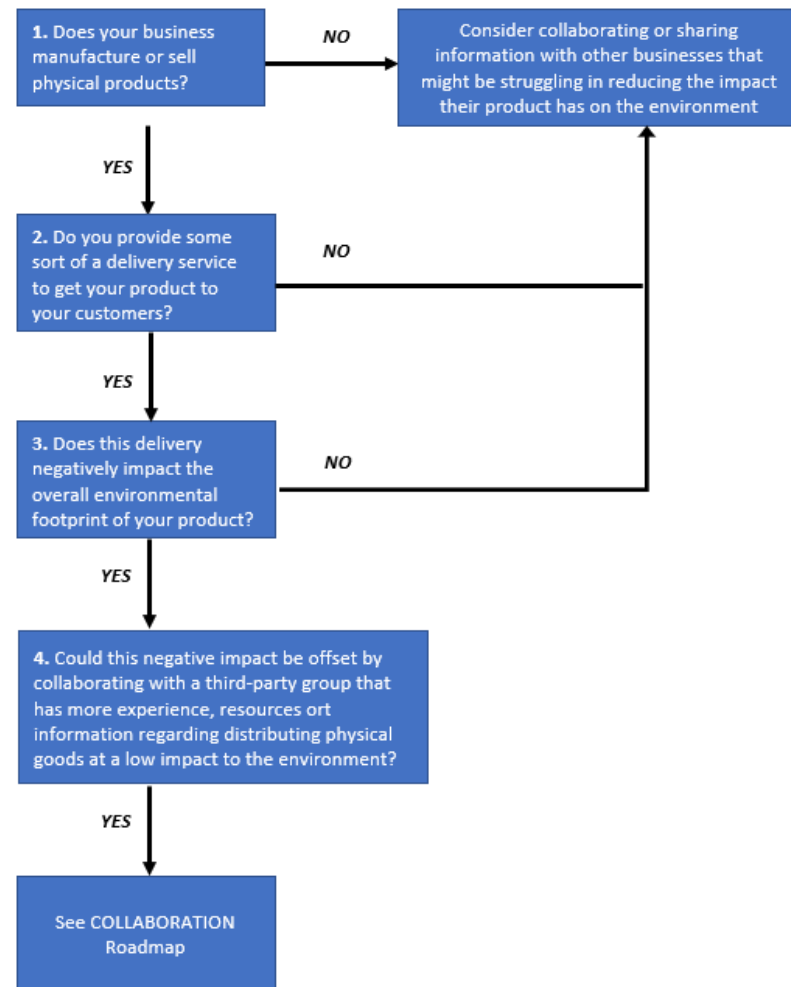


Key Activities:

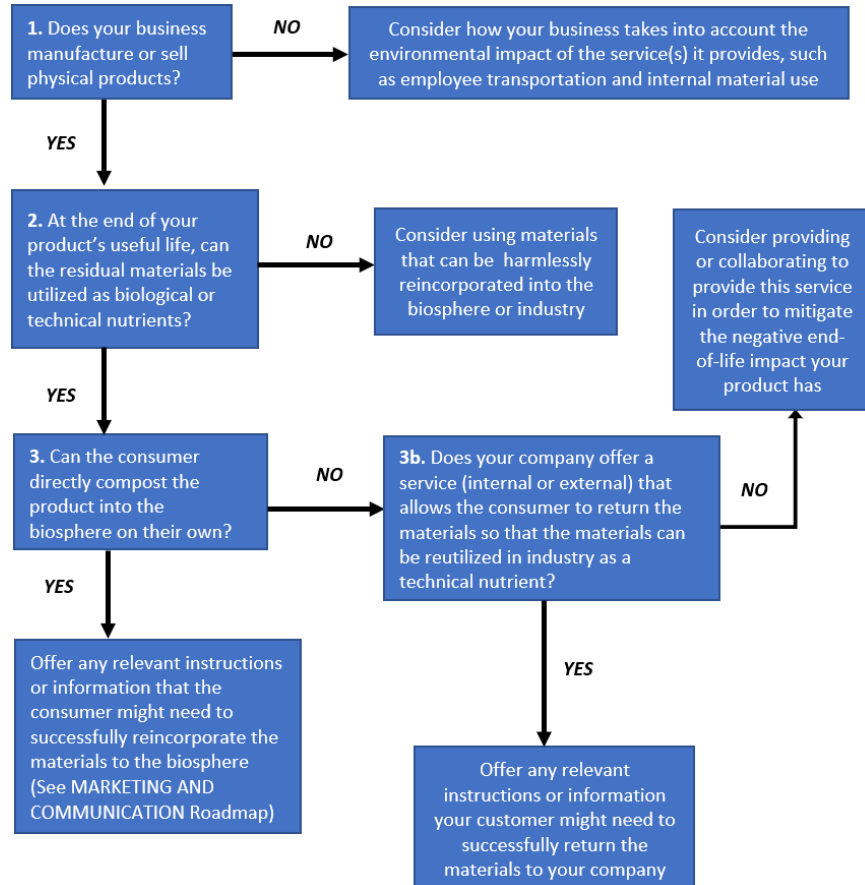
Design and Production Roadmap:



Distribution Roadmap:

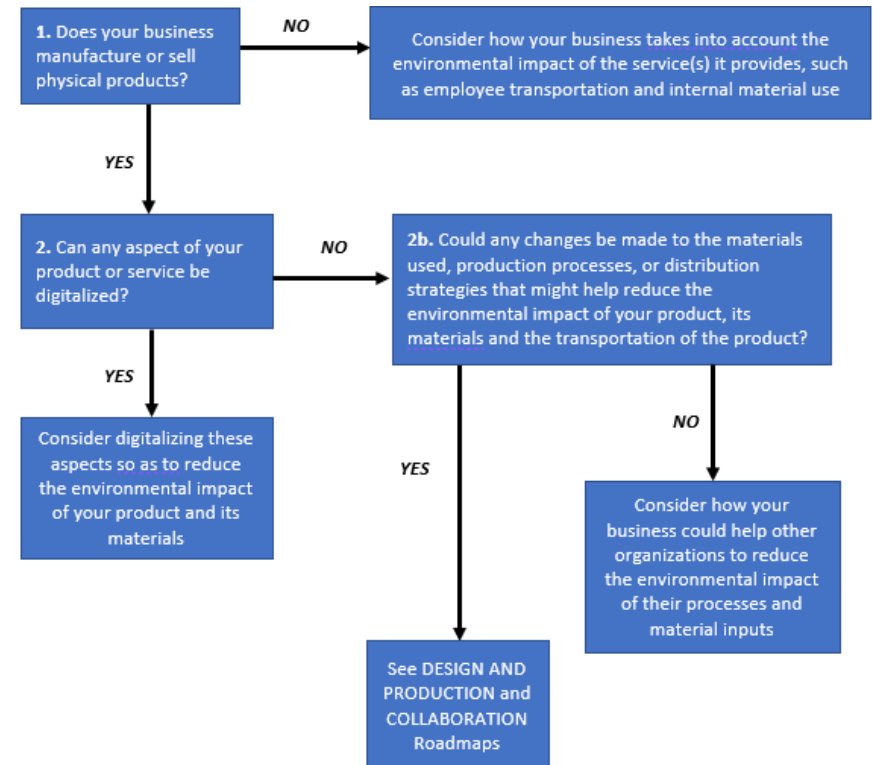


Reverse Logistics Roadmap:



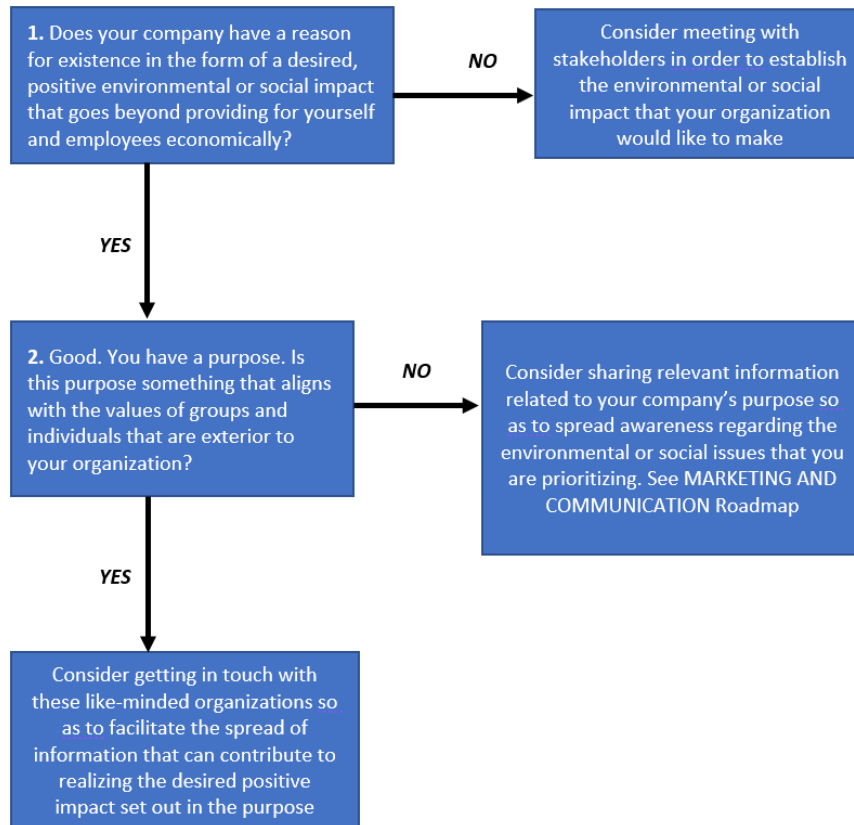
Key Resources:

Technology and Innovation Roadmap:

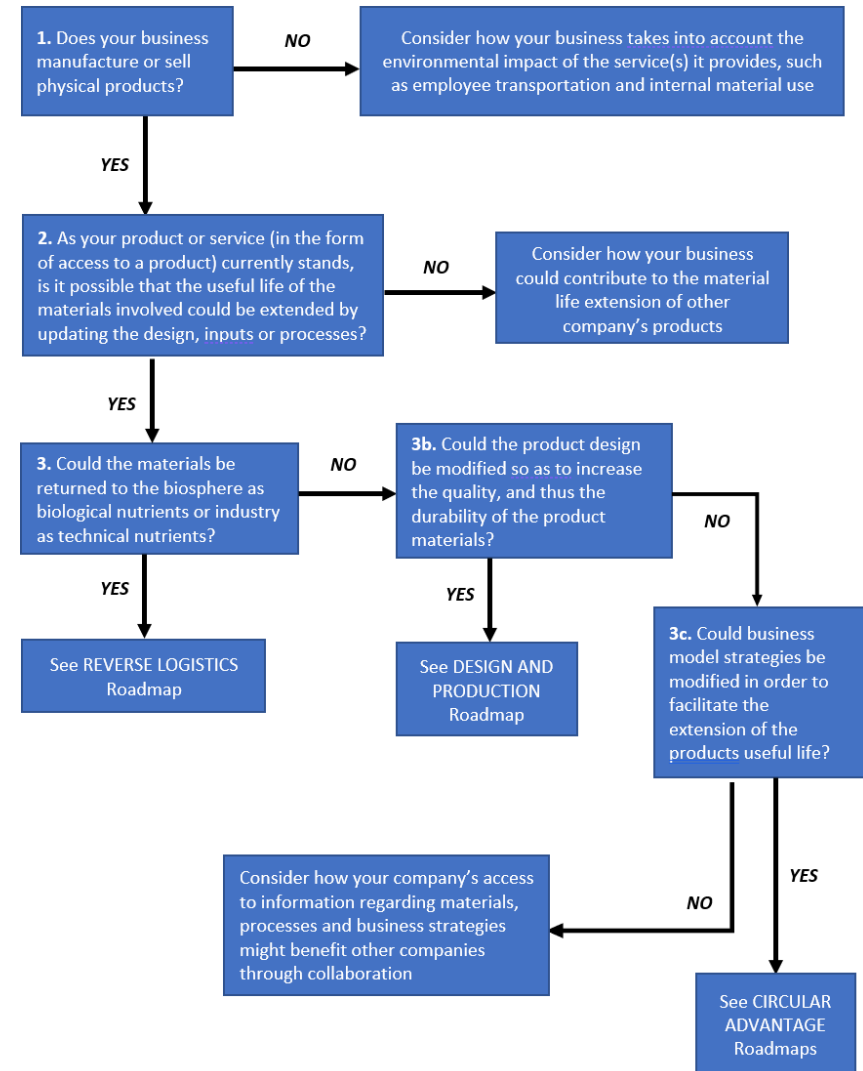


Value Propositions:

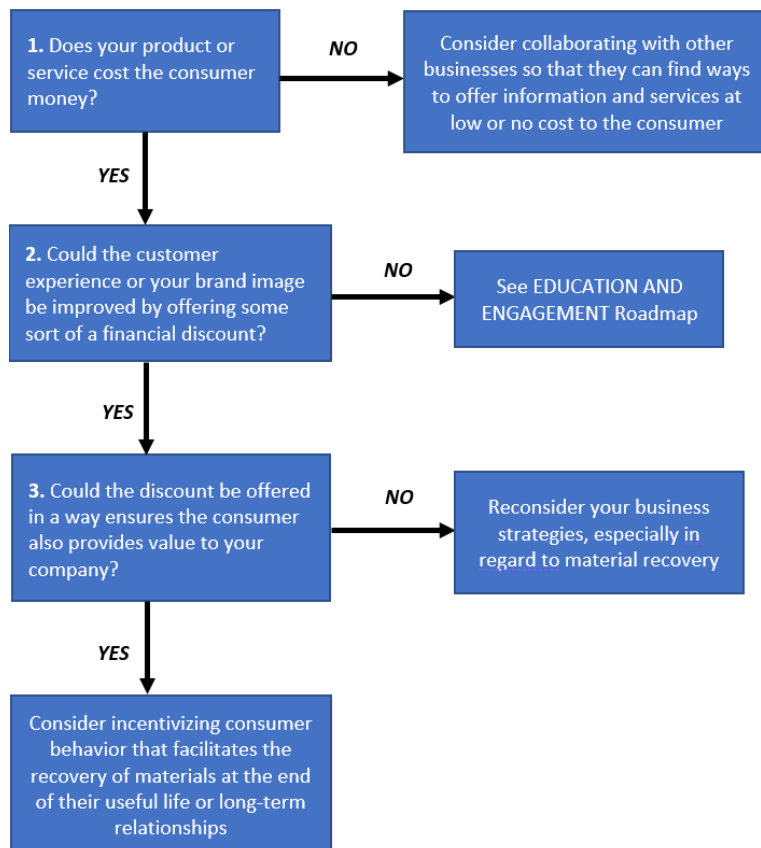
Purpose Roadmap:



Material Life Extension Roadmap:

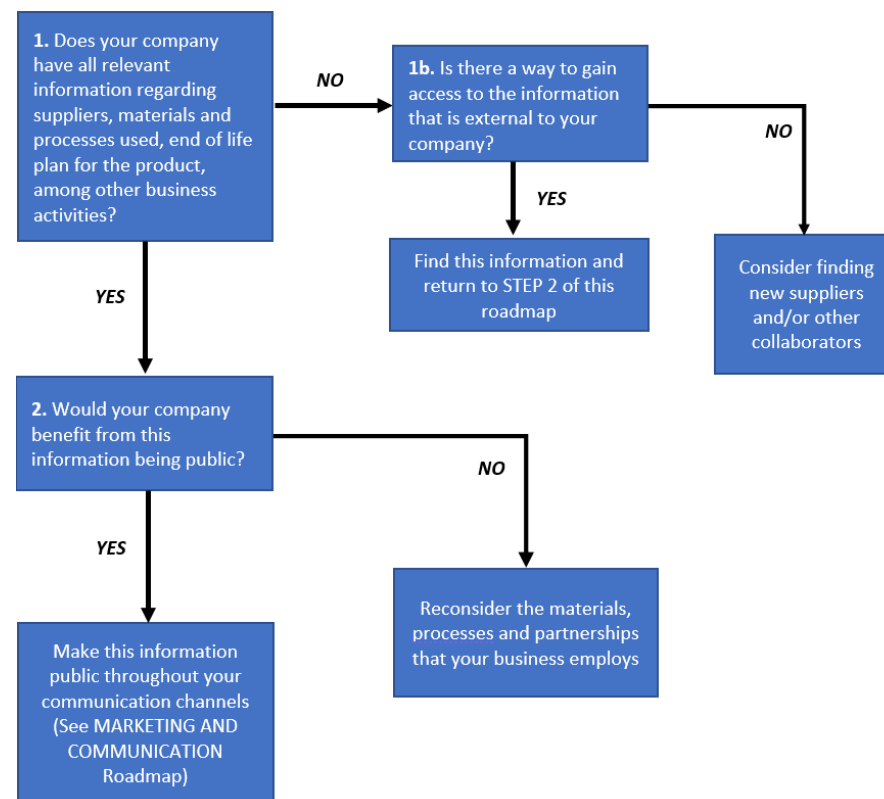


Incentivization Roadmap:



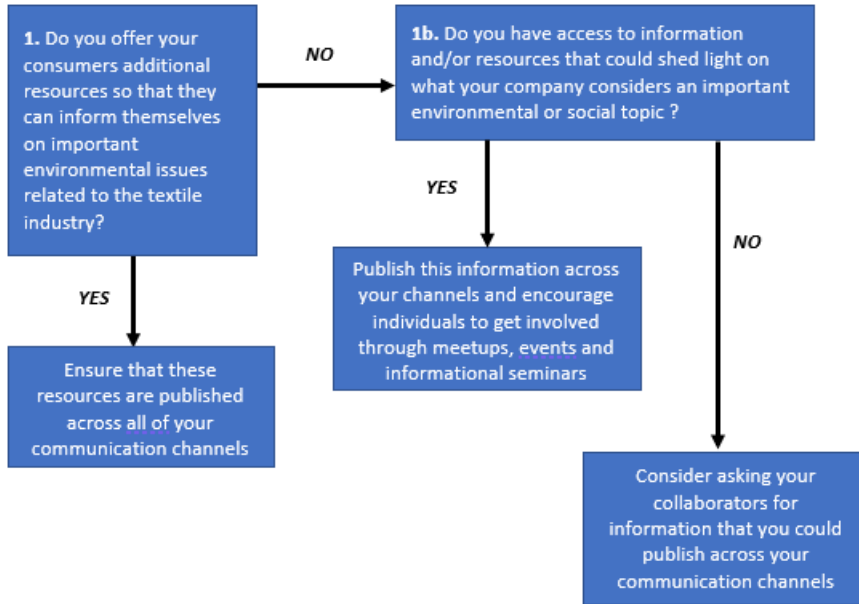
Customer Relationships:

Transparency Roadmap:

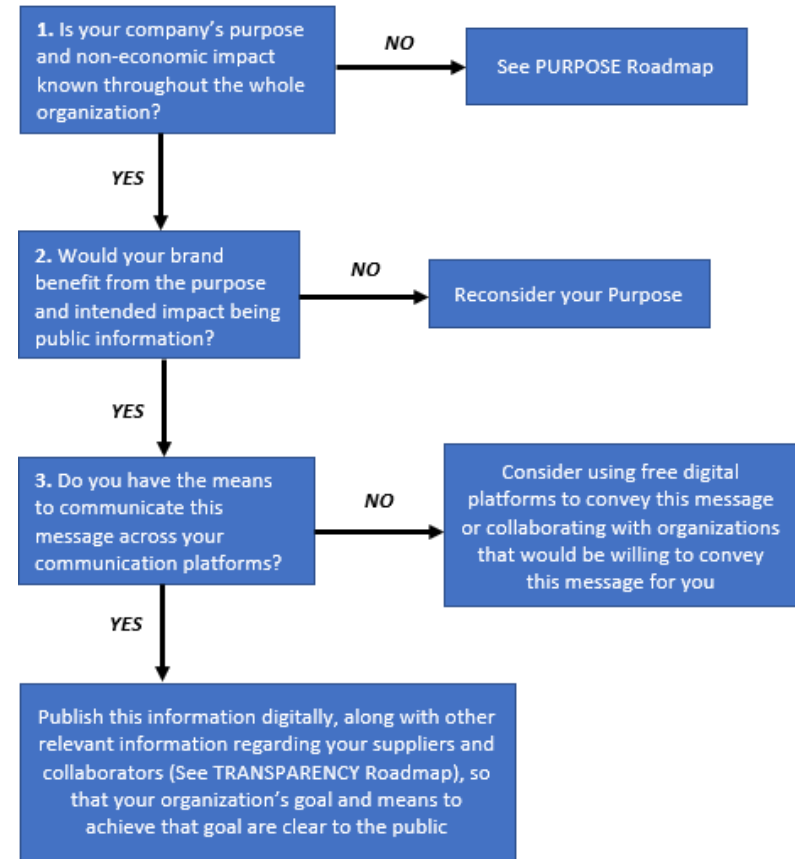


Customer Segments:

Education and Engagement Roadmap



Channels:



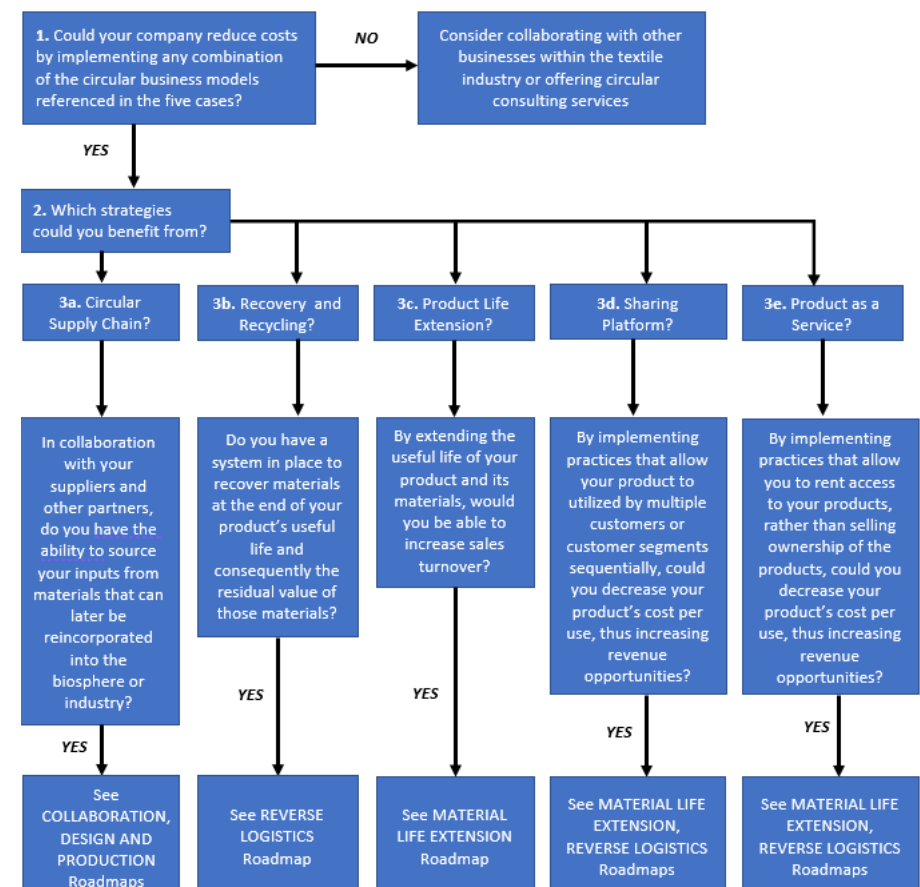
Cost Structure:

Circular Cost Advantage Roadmap:



Revenue Streams:

Circular Revenue Advantage Roadmap:



6. Conclusions

When considering industry from the perspective of historical norms like short-term profit maximization and low-cost production, it is not only inefficient in terms of waste generation but also because it misses out on huge amounts of material value when products are improperly used and discarded. Scientific and technological advancements over the past decades have allowed humans to realize that some of the most pressing issues for the generations to come are directly related to the impact of organized human activity and the extended effect of this activity on the earth's environment.

The Circular Economy, presented as a medley of different strategies revolving around recapturing 'lost' material value in various ways and designing quality, durable products that are meant to be used, seeks to trigger a paradigm shift regarding waste and the disposability of products and materials. The concept of closing material loops so that materials themselves can repeatedly be plugged back into technical and biological cycles is a pillar of circular thinking and is widely recognized as a key to re-imagining a less wasteful world. While companies in the private sector taking matters into their own hands by implementing CE strategies and business models is a step in the right direction, collaboration from many different actors is necessary to completely eradicate industry's wasteful tendencies.

By collectively identifying industries that are especially wasteful and focusing on regulating production activities, encouraging cooperation, and incentivizing responsible manufacturer and consumer behavior, governments and policymakers can play a huge part in setting the table for these industries to reclaim lost economic value. The textile industry is uniquely positioned to be a trailblazer for circular businesses and consumer activity due to its many negative externalities, and there are numerous examples of companies that are poised to lead the way by innovating through recycled and recyclable material development and through application of new types of business models that have seldom been applied to textiles.

When responsible, transparent behavior on the part of businesses is rewarded by government policies, the consumer becomes a powerful catalyst in making the change towards circularity, as trends show that individuals generally want products and services that are produced sustainably and are designed to benefit society and the environment. While some statistics regarding waste creation, pollution, and poor labor practices within

the global textile supply chain may seem grim, there is much promise in the newfound focus of applying circular principles to reduce waste and resource use, curtail social disparities and, above all, benefit from reclaimed economic value.

There does not exist one correct solution or a quick fix to the complex issues surrounding the environment, society, or the economy, but by observing the many businesses and organizations around the world that are leading by example and following suit, progress can be made little by little. “The Entrepreneur’s Guide to Circular Textiles” is just one way for people who are considering starting their own clothing company (or already have) to consider the many business decisions they’ll have to make and to reflect on the tri-dimensional repercussions of those decisions.

7. Bibliography

- Abraham, K. G. & Mackie, C. D., 2005. Beyond the Market: Designing Nonmarket Accounts for the United States. 141-162 ed. s.l.:National Academic Press.
- Banerji, A., 2019. Factbox: Grief and neglect - 10 factory disasters in South Asia. [Online] Available at: <https://www.reuters.com/article/us-india-fire-workers-factbox-idUSKBN1YE1PT> [Accessed 25 February 2021].
- Bocken, N., de Pauw, I., van der Grinten, B. & Bakker, C., 2016. Product design and business model strategies for a circular economy. *Journal of Industrial and Production Engineering*, 33(5), pp. 308-320.
- Cambridge Dictionary, 2021. Sustainable. [Online] Available at: <https://dictionary.cambridge.org/es-LA/dictionary/english/sustainable> [Accessed 12 February 2021].
- Certified B Corporation, 2021. About B Corps. [Online] Available at: <https://bcorporation.net/about-b-corps> [Accessed 5 April 2021].
- CGC, 2019. Business with Purpose and The Rise of the Fourth Sector in Ibero-America, Madrid: Center for the Governance of Change, IE University.
- Circle Economy, 2015. Service-based business models & circular strategies for textiles , s.l.: Sitra.
- Circos, 2021a. About Circos. [Online] Available at: <https://circos.co/about/> [Accessed 3 May 2021].
- Circos, 2021b. Affordable. [Online] Available at: <https://circos.co/about/affordable/> [Accessed 22 April 2021].
- Circos, 2021c. Convenient. [Online] Available at: <https://circos.co/about/convenient/> [Accessed 29 April 2021].
- Circos, 2021d. Shop Vigma. [Online] Available at: https://circos.co/shop/?circos_range_size=Kids+62-68&product-brand=vigma [Accessed 1 May 2021].
- Circos, 2021e. Our Story. [Online] Available at: <https://circos.co/about/story/> [Accessed 18 April 2021].
- Close the Loop, 2021. Nudie Jeans. [Online] Available at: <https://www.close-the-loop.be/en/case/77/nudie-jeans/3> [Accessed 4 April 2021].
- Closing the Loop. 2018. [Film] Directed by Graham Sheldon. s.l.: s.n.
- Design School Kolding, 2016. VIGGA's Vision. [Online] Available at: <https://www.designskolenkolding.dk/en/news/viggas-vision> [Accessed 14 April 2021].
- Dutch Awearness, 2018. Cliff. [Online] Available at: <https://dutchawearness.com/cliff/> [Accessed 15 April 2021].
- Earley, K., 2014. Dutch aWEARness Creating the First Circular Supply Chain for Textiles. [Online] Available at: <https://sustainablebrands.com/read/defining-the-next-economy/dutch->

- awareness-creating-the-first-circular-supply-chain-for-textiles [Accessed 28 April 2021].
- Ecoalf, 2021a. Because there is no Planet B. [Online]
Available at: https://ecoalf.com/es/p/planet-because-there-is-no-planet-b-91?_adin=01382452844 [Accessed 3 April 2021].
- Ecoalf, 2021b. Purpose. [Online]
Available at: https://ecoalf.com/es/p/purpose--88?_adin=01382452844 [Accessed 2 April 2021].
- Ecoalf, 2021c. Upcycling the Oceans. [Online]
Available at: a handbook for visionaries, game changers, and challengers (The Strategyzer series) [Accessed 1 April 2021].
- Ecoalf, 2021d. Upcycling the Oceans España. [Online]
Available at: https://ecoalf.com/es/p/upcycling-the-oceans-espana-16?_adin=01382452844 [Accessed 1 April 2021].
- Ecoalf, 2021e. Upcycling the Oceans Tailandia. [Online]
Available at: https://ecoalf.com/es/p/upcycling-the-oceans-tailandia-17?_adin=01382452844 [Accessed 3 April 2021].
- Ellen MacArthur Foundation, 2012. Towards the circular economy: Economic and business rationale for an accelerated transition, s.l.: Ellen MacArthur Foundation.
- Ellen MacArthur Foundation, 2014. Towards the Circular Economy: Accelerating the scale-up across global supply chains, s.l.: Ellen MacArthur Foundation.
- Ellen MacArthur Foundation, 2015. Growth Within: A Circular Economy Vision for a Competitive Europe, s.l.: Ellen MacArthur Foundation.
- Ellen MacArthur Foundation, 2017a. A new textiles economy: Redesigning fashion's future, s.l.: Ellen MacArthur Foundation.
- Ellen MacArthur Foundation, 2017b. Fashion and the circular economy. [Online]
Available at: <https://www.ellenmacarthurfoundation.org/explore/fashion-and-the-circular-economy> [Accessed 14 February 2021].
- Ellen MacArthur Foundation, 2017c. What is the Circular Economy?. [Online]
Available at: <https://www.ellenmacarthurfoundation.org/circular-economy/what-is-the-circular-economy> [Accessed 20 February 2021].
- Ellen MacArthur Foundation, 2017. Fashion and the circular economy. [Online]
Available at: <https://www.ellenmacarthurfoundation.org/explore/fashion-and-the-circular-economy> [Accessed 14 February 2021].
- Ellen MacArthur Foundation, 2019. Circular economy systems diagram. [Online]
Available at: <https://www.ellenmacarthurfoundation.org/circular-economy/concept/infographic> [Accessed 10 May 2021].
- Ellen MacArthur Foundation, 2020. Increasing clothing use through subscription. [Online]
Available at: <https://www.ellenmacarthurfoundation.org/case-studies/why-buy-when-you-can-borrow> [Accessed 25 April 2021].
- Engelman, R., 2013. Beyond Sustainability. In: State of the World 2013: Is sustainability still possible?. s.l.: Island Press, pp. 3-16.
- European Commission, 2014b. Clothing Project to Explore the Circular Economy for Textiles. [Online]

Available at: https://ec.europa.eu/environment/ecoap/about-eco-innovation/good-practices/eu/20140318-clothing-project-to-explore-the-circular-economy-for-textiles_en
[Accessed 2 May 2021].

European Commission, 2014. Clean Technologies: circular supply chains, s.l.: Business Innovation Observatory.

European Commission, 2019a. Sustainable garment value chains. [Online]
Available at: <https://www.switch-asia.eu/resource/sustainable-garment-value-chains/>
[Accessed 10 March 2021].

European Commission, 2019b. Sustainable Products in a Circular Economy - Towards an EU Product Policy Framework contributing to the Circular Economy, Brussels: European Commission.

European Commission, 2019c. The European Green Deal, Brussels: European Commission.

European Commission, 2020a. A new Circular Economy Action Plan: For a cleaner and more competitive Europe, Brussels: European Commission.

European Commission, 2020b. Strategic EU Ecolabel Work Plan 2020-2024, Brussels: European Commission.

European Environment Agency, 2019. Textiles in Europe's circular economy, s.l.: European Environment Agency.

European Parliament, 2018a. Plastic in the ocean: the facts, effects and new EU rules. [Online]
Available at: <https://www.europarl.europa.eu/news/en/headlines/priorities/circular-economy/20181005STO15110/plastic-in-the-ocean-the-facts-effects-and-new-eu-rules>
[Accessed 28 March 2021].

European Parliament, 2018b. Waste management in the EU: infographic with facts and figures. [Online]
Available at: <https://www.europarl.europa.eu/news/en/headlines/priorities/circular-economy/20180328STO00751/eu-waste-management-infographic-with-facts-and-figures>
[Accessed 27 February 2021].

European Parliament, 2020a. The impact of textile production and waste on the environment (infographic). [Online]
Available at: <https://www.europarl.europa.eu/news/en/headlines/priorities/circular-economy/20201208STO93327/the-impact-of-textile-production-and-waste-on-the-environment-infographic> [Accessed 26 February 2021].

European Parliament, 2020b. What if fashion were good for the planet?. [Online]
Available at:
[https://www.europarl.europa.eu/RegData/etudes/ATAG/2020/656296/EPRS_ATA\(2020\)656296_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/ATAG/2020/656296/EPRS_ATA(2020)656296_EN.pdf) [Accessed 14 March 2021].

European Parliamentary Research Service, 2018. Circular economy. [Online]
Available at:
<https://www.europarl.europa.eu/thinktank/infographics/circulareconomy/public/index.html> [Accessed 26 February 2021].

- Friedman, M., 1970. The Social Responsibility Of Business Is to Increase Its Profits. The New York Times, 13 September.
- Frosch, R. A. & Gallopoulos, N. E., 1989. Strategies for Manufacturing. Scientific American, Volume 161, pp. 144-152.
- Furlong, H., 2017. New Track and Trace Tool Enables Transparent, Circular Supply Chains. [Online]
Available at: <https://sustainablebrands.com/read/cleantech/new-track-and-trace-tool-enables-transparent-circular-supply-chains> [Accessed 12 May 2021].
- Ghemawat, P. & Nueno, J. L., 2006. Zara: Fast fashion, s.l.: Harvard Business School.
- Ghisellini, P., Cialani, C. & Ulgiati, S., 2016. A review on circular economy: The expected transition to a balanced interplay of environmental and economic systems. Journal of Cleaner Production, February, 114(Towards Post Fossil Carbon Societies: Regenerative and Preventative Eco-Industrial Development), pp. 11-32.
- Global Fashion Agenda & The Boston Consulting Group, 2017. Pulse of the Fashion Industry 2017, s.l.: Global Fashion Agenda & The Boston Consulting Group.
- Handy, C., 2002. What's a Business For?. Harvard Business Review, December, pp. 49-55.
- I:CO, 2021a. Building Textile Circularity. [Online]
Available at: <https://www.ico-spirit.com/en/company/> [Accessed 12 April 2021].
- I:CO, 2021b. I:CO News. [Online]
Available at: <https://www.ico-spirit.com/en/homepage/news/> [Accessed 12 April 2021].
- I:CO, 2021c. I:Collect. [Online]
Available at: <https://www.soex.de/en/icollect/> [Accessed 7 April 2021].
- I:CO, 2021d. JOIN THE I:COLUTION RETHINK, REUSE, RECYCLE, RENEW. [Online]
Available at: <https://www.ico-spirit.com/en/> [Accessed 10 April 2021].
- I:CO, 2021e. Partnership Based on Confidence. [Online]
Available at: <https://www.ico-spirit.com/en/referenzen/partner/> [Accessed 10 April 2021].
- Kant, R., 2012. Textile dyeing industry: An environmental hazard. Natural Science, 4(1), pp. 22-26.
- Kirchherr, J., Reike, D. & Hekkert, M., 2017. Conceptualizing the circular economy: An analysis of 114 definitions. Resources, Conservation & Recycling, Volume 127, pp. 221-232.
- Lacy, P. & Rutqvist, J., 2015. Waste to Wealth: The Circular Economy Advantage. 1st Edition ed. s.l.:Palgrave Macmillan.
- Lewis, T., 2021. Why parents are choosing to rent their kids' clothes. [Online]
Available at: <https://amp.theguardian.com/fashion/2021/apr/25/why-parents-are-choosing-to-rent-their-kids-clothes> [Accessed 29 April 2021].
- McDonough, W. & Braungart, M., 2002. Cradle to Cradle: Remaking the way we make things. First edition ed. s.l.:North Point Press.
- McDonough, W. & Braungart, M., 2013. The upcycle: Beyond sustainability - Designing for abundance. First edition ed. s.l.:s.n.

- Nudie Jeans, 2019. Nudie Jeans Sustainability report 2019, s.l.: s.n.
- Nudie Jeans, 2021a. Sustainability is no longer a trend. It is a profound change for a better future.. [Online]
Available at: <https://www.nudiejeans.com/blog/sustainability-is-no-longer-a-trend-it-is-a-profound-change-for-a-better-future> [Accessed 14 April 2021].
- Nudie Jeans, 2021b. Free Repairs Forever. [Online]
Available at: <https://www.nudiejeans.com/free-repairs> [Accessed 14 April 2021].
- Nudie Jeans, 2021d. Stores. [Online]
Available at: <https://www.nudiejeans.com/stores> [Accessed 1 May 2021].
- Nudie Jeans, 2021d. The Journal. [Online]
Available at: <https://www.nudiejeans.com/blog> [Accessed 3 April 2021].
- Olivares, D., 2018. Una historia de éxito: Ecoalf. [Online]
Available at: <https://www.muypymes.com/2018/09/19/una-historia-de-exito-ecoalf> [Accessed 4 April 2021].
- Osterwalder, A. & Pigneur, Y., 2010. Business Model Generation: a handbook for visionaries, game changers, and challengers (The Strategyzer series). s.l.:John Wiley & Sons.
- People's Republic of China, 2008. Circular Economy Promotion Law. Shanghai: Shanghai Cooperation Organization Environmental Information Sharing Platform.
- Porter, M. E. & Kramer, M. R., 2002. The Competitive Advantage of Corporate Philanthropy. Harvard Business Review, December, pp. 56-68.
- Reconsidered, 2021. 3 Questions With: Erick Bouwer, CEO, CIRCOS. [Online]
Available at: <https://www.reconsidered.co/3-questions-with/circos-ceo-erick-bouwer-circular-economy> [Accessed 22 April 2021].
- Reike, D., Vermeulen, W. J. & Witjes, S., 2018. The circular economy: New or Refurbished as CE 3.0?—Exploring Controversies in the Conceptualization of the Circular Economy through a Focus on History and Resource Value Retention Options. Resources, Conservation & Recycling, 135(Sustainable Resource Management and the Circular Economy), pp. 246-264.
- Remy, N., Speelman, E. & Swartz, S., 2016. Style that's sustainable: A new fast-fashion formula. The circular economy: Moving from theory to practice, Issue Special edition, pp. 31-36.
- Richero, R. & Ferrigno, S., 2016. A Background Analysis on Transparency and Traceability in the Garment Value Chain, s.l.: DAI.
- Rossé, M., Stuchtey, M. & Vanthournout, H., 2016. Finding growth within: A new framework for Europe. The circular economy: Moving from theory to practice, October, Issue Special edition, pp. 4-10.
- Shergold, P., 2016. Three Sectors, One Public Purpose. In: The Three Sector Solution: Delivering Public Policy in Collaboration with Not-for-Profits and Business. s.l.:ANU Press, pp. 23-32.
- Slaper, T. F. & Hall, T. J., 2011. The Triple Bottom Line: What Is It and How Does It Work?. Indiana Business Review, Issue Spring, pp. 4-8.
- SOEX, 2021a. SOEX TVG. [Online]
Available at: <https://www.soex.de/en/tvg/> [Accessed 10 April 2021].

- SOEX, 2021b. History. [Online] Available at: <https://www.soex.de/en/about-us/history/>
[Accessed 14 April 2021].
- Stahel, W., 2010. The Performance Economy. 2nd Edition ed. New York: Palgrave Macmillan.
- UN Global Compact, 2014. A Guide to Traceability: A Practical Approach to Advance Sustainability in Global Supply Chains, New York: United Nations Global Compact Office.
- United Nations, 2015. Transforming our World: The 2030 Agenda for Sustainable Development, s.l.: United Nations.
- United Nations, 2019. Sustainable Development Goals. [Online] Available at: <https://www.un.org/sustainabledevelopment/news/communications-material/>
[Accessed 25 May 2021].
- United States Environmental Protection Agency, 2021. How does anaerobic digestion work?. [Online] Available at: <https://www.epa.gov/agstar/how-does-anaerobic-digestion-work>
[Accessed 15 May 2021].
- WearEver, 2018. WearEver. [Online] Available at: <http://wearever.nl/>[Accessed 3 May 2021].
- Woo, A., 2017. Recycling old clothes more common now. [Online] Available at: <https://www.straitstimes.com/lifestyle/fashion/fast-fashion-wears-green>
[Accessed 7 April 2021].
- World Commission on Environment and Development, 1987. Our common future, Oxford: Oxford University Press.

DOCUMENTOS DE TRABAJO

La serie Documentos de Trabajo que edita la Cátedra de Responsabilidad Social Corporativa de la UAH, incluye avances y resultados de los trabajos de investigación realizados como parte de los programas y proyectos de la Cátedra y por colaboradores de la misma.

Los Documentos de Trabajo se encuentran disponibles en internet

<http://crsc.uah.es>

ISSN: 2530-1292

Universidad
de AlcaláCÁTEDRA DE RESPONSABILIDAD
SOCIAL CORPORATIVA
UAH - SANTANDER

Facultad de Ciencias Económicas, Empresariales y Turismo. Plaza de la Victoria, 2. 28802. Alcalá de Henares. Madrid - Telf. (34)918855187. E-Mail: catedra.rsc@uah.es

CÁTEDRA DE RESPONSABILIDAD SOCIAL CORPORATIVA

DIRECTORA

Dra. Dña. Elena Mañas Alcón

Profesora Titular de Universidad, Universidad de Alcalá