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How can the circular economy model lead to a more sustainable fashion supply chain?

An analysis of circular fashion brands and their supply chain management

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Introduction

The textile and garment industry makes a large contribution to the global economy, currently employing over 75 million people, and contributing $2.4 trillion to manufacturing worldwide. Unfortunately, today, this sector is also one of the most polluting industries globally. It is responsible for over 8% of greenhouse gas (GHG) emissions and 20% of industrial wastewater pollution. Moreover, the industry wastes over $500 billions of value each year, due to clothing underutilization and lack of recycling (The UN Fashion Alliance Website, n.d.). Additionally, the working conditions at some stages of the industry's value chain are known to be poor, and the wages usually rather low.

The capitalist society in which we live is encouraging overconsumption, therefore increasing the amount of clothes produced, as well as all the externalities resulting from their production. Hence, the question arises of how to reconcile our society with a sustainable way of producing, consuming and living. How to enable the pleasure of (sometimes unnecessary) purchases while avoiding a negative impact on the environment and society? I propound that circular economy can be the answer to these questions. Thus, this paper investigates the positive environmental and social outcomes that a circular economy model can generate in the fashion industry, on a company-level.

This paper aims at answering the following question: "How can the circular economy model lead to a more sustainable fashion supply chain?". To do so, a literature review will introduce the topic, addressing the linear economy model, the rising need for sustainability, alternative business models, and the circular economy model. Next, a case-study analysis will be presented, investigating four fashion companies which have integrated circularity in their business models, and their respective impacts on the environment and society. To conclude, a summary of the different initiatives that can be taken within the circular business model and their impact will be presented.

Part A: Literature Review

This section of the thesis will discuss the available literature on the current economic model used in the fashion industry, the need for a change from this model as well as the reasons for it, and the different alternatives available.

Chapter 1: Linear Economy and the Fast Fashion Model

1.1 The Linear Model

The fashion industry currently operates under a linear economy model, also known as "take-make-dispose". The linear model is the traditional pattern of design, production and consumption, that has been used since the Industrial Revolution in most industries around the world (Butterworth et al., 2014). This model has allowed countries to recover from the Second World War by boosting their economy through an emphasis on growth and efficiency. Over the years, this productivity approach has evolved into a consumption model, being more and more accommodating of customers' needs. Adding to this the globalization trends and the competition resulting from it, this model has turned the global economy into the waste machine that we are all familiar with today (Thomas, 2016). This pattern of production has developed with the idea that resources and waste are infinite. Indeed, companies are currently producing goods using large amounts of raw materials, energy and labor, that consumers use and then dispose of, once these do not satisfy their needs anymore (Ellen MacArthur Foundation, 2015). This habit of discarding results in the continuous use of new resources, as well as extremely large amounts of waste, even though usually most of the resources used to produce the goods could be restored for further use.

Unfortunately, waste is not the only negative externality of the linear model. Other costs result from this way of producing and consuming, such as the energy consumption from fossil fuel which contributes to the erosion of ecosystems, and the degradation of our planet (Ellen MacArthur, 2013).

As the costs of these externalities are not accounted for in common accounting and financial reports, businesses do not have any financial incentives to reduce them (Ellen MacArthur, 2013).

Companies have tried to improve the current system by making it more efficient. Yet, as long as they keep producing in a resource-intensive way, instead of shifting the system to a restorative one, externalities will remain.

1.2 Limitations of the Linear Model

Several challenges are slowly jeopardizing this current model.

Firstly, as the global population is growing exponentially, the need for resources is similarly increasing. The need for additional infrastructure is also becoming increasingly important in order to accommodate the growing population and to access resources to satisfy everyone's needs (National Academies of Sciences, Engineering and Medicine, 1993).

Additionally, the speed at which humans produce is substantially higher than the one at which the planet restores its natural resources. Therefore, raw materials are becoming increasingly scarce, and also more and more expensive. As prices increase, companies are realizing that consuming new natural resources every time might not be the most economical way of producing anymore.

Furthermore, all over the world and especially in developing countries, the medium class is growing, resulting in more demand for goods and therefore even more demand for scarce resources (Thomas, 2016).

Finally, due to the climate crisis we are currently witnessing, people are realizing that continuously consuming the planet's resources is not a sustainable way of living. A need for a new way of producing and consuming is arising.

1.3 The Fast Fashion Model

The extreme example of a linear model in the fashion industry is the fast fashion model. Fast fashion can be defined in different ways:

> "Fast fashion is the production and promotion of cheap and readily disposable clothes" — Liz Barns & Gaynor Lea-Greenway (2006)

> "Fast fashion is creativity and quality design together with a response to market demands. It is the democratization of fashion" — Inditex Group (2020)

> "Fast fashion is the convenience of being able to change your look" — Katerina Ang (2019)

In short, fast fashion is a way of producing and selling clothes in an inexpensive way to the mass market, in response to the current fashion trends (Fast fashion, n.d.). It encourages customers to buy in bulk, and usually unnecessarily.

The fast fashion model is characterized by a rapid adaptation to demand, usually achieved by spotting trends on runways and in the streets (Cachon & Swinney, 2011; Brooks, 2015), as well as by closely monitoring inventories in order to identify which products are selling fast and which are failing. To achieve this rapid adaptation, companies had to modify their entire supply chain, by:

— Reducing their design-to-retail cycles: companies have cut down their production cycles to thirty days, meaning they now design, produce and distribute goods in less than a month, compared to the usual calendar year of spring/summer and autumn/winter seasons (Anguelov, 2016).
— Vertically integrating their operations: Synchronization throughout the supply chain is essential to achieve the shortened lead time. Therefore, clothing producers have to internalize most of the value-adding activities, to allow for information to travel fast from the retail stores to the beginning of the supply chain, and to adapt more easily to a flexible demand (Anguelov, 2016; Bhardwaj & Fairhurst, 2010).

Fast fashion companies offer low-price average-quality fashion goods to a large group of customers. To do so, they usually subcontract labor-intensive tasks: some of the most time-consuming tasks are usually outsourced to developing countries in order to keep costs down. Indeed, by avoiding to build new facilities, and outsourcing to countries where wages are substantially lower, companies can significantly reduce their costs and therefore, their prices for the mass market.

To increase sales further, the industry has broken down the calendar year in not 4, but up to 24 seasons. This allows brands to make customers believe they constantly need new clothes, and therefore to stimulate the buying behavior (UK House of Commons, 2019). Companies have managed one of the biggest bluffs: making customers believe that they create the trends. Most of us think trends are the result of cultural change and adjustments in society's needs and wants, yet culture is slow to change (Anguelov, 2016), therefore these quick shifts cannot be due to culture. In fact, trends are created by insiders of the fashion industry: they are forecasted, then created by fashion designers and finally advertised and sold by apparel retailers to the mass public, which allows companies to sell more and also more frequently, as these trends have rather short life spans (Lopes, 2019).

"It is more accurate to say that trends are changed, rather than that trends change." — Nikolay Anguelov (2016)

It is therefore important to highlight that fashion sales are not consumer-driven but retail-driven (Brooks, 2015). The fast fashion giants, each year, inspire themselves from luxury brands' catwalks to release collections which they describe as "trendy". As all retailers operate the same way, consumers get the feeling that "this is how we should dress this season", as this is all they can see in shops. It works!

Yet, due to the proliferation of social media, information is no longer only flowing from brands to customers. Therefore, companies do make use of their targets' opinions to adapt their offering, and remain relevant (Anguelov, 2016; Bhardwaj & Fairhurst, 2010). This in turn allows brands to sell even more, through the now well-known concept of mass customization: a marketing and manufacturing technique which combines the flexibility and personalization of custom-made products with the low unit costs associated with mass production (Dollarhide, 2019).

The Case of Zara

Zara, from the Inditex group, is the leader and pioneer of the fast fashion model. Indeed, it counts over 300 designers in its ranks, who are constantly on the lookout for new trends to exploit (Mayrhofer & Roederer, 2011). As Amancio Ortega, the founder of the group, says: "Flogging fashion is like selling fish. Fresh fish, like a freshly cut jacket in the latest color, sells quickly and at a high price. Yesterday's catch must be discounted and may not sell at all" (Inditex: Fashion forward, 2012). This sentence describes Zara's business model: spot trends, design, sell, start again.

The company manages its stores through constant communication of sales and inventory, as each retail store sends information twice a week to headquarters, and receives new merchandise accordingly (Crofton & Dopico, 2007). This is done through personal digital assistants (PDAs), computers available for each store's management (Aftab et al., 2018). Therefore, on top of avoiding large stocks and as a result decreasing inventory costs, this business model allows the brand to adapt to trends happening inside seasons. In fact, seasonal collections result in less than 40% of total sales, whereas the remaining 60% are generated by inside-season modifications in colors, cuts and fabrics (Crofton & Dopico, 2007). To complement this, Zara works with just-in-time manufacturing (Mayrhofer & Roederer, 2011), allowing it to bring down its design-to-retail cycle to as low as 2–3 weeks, compared to the 5-month industry average (Aftab et al., 2018).

These shortened design-to-retail cycles are also enabled through the group's highly synchronized supply chain. Indeed, the Inditex group owns one of the most vertically integrated chain in the industry, as its manufacturing is still done in-house, compared to most of its competitors (Mayrhofer & Roederer, 2011). Initially, the group used to perform all value-adding tasks in-house, such as raw material purchases, design, cut, dyeing, quality control, ironing, packaging and labeling, distribution, logistics, and only outsourced the labor-intensive and low value-adding tasks such as sewing (Crofton & Dopico, 2007). Yet, nowadays only 50% of its production is done in-house, the rest being outsourced to Asia and Europe (Aftab et al., 2018).

At Zara, products are considered as "non-durables"— pieces of clothing usually stay around 4 weeks in store and, if not sold, are sent back to warehouses. The company releases 50,000 different designs each year (Aftab et al., 2018). This constant change in offering creates scarcity value, which further stimulates sales, as shoppers know that a piece of clothing they do not buy now probably will not be available next week (Crofton & Dopico, 2007).

Finally, in order to beat its competitors, Inditex avoids cost-plus pricing, but rather adopts competitive pricing by establishing its prices 15% below its competitors' (Aftab et al., 2018).

Zara has managed to build a very efficient business model. Unfortunately, due to these practices, the brand is draining the Earth of its resources, heavily polluting soils, oceans and the air, and abusing its workers (Chua, 2019), only to produce average-quality clothes which are likely to end up in landfills less than a year after being produced (Ellen MacArthur Foundation, 2017).

The Case of H&M

When it comes to fast fashion, H&M is also one of the first brands that come to mind. Indeed, with 4,492 stores in four continents and 74 markets (H&M Group Website, n.d.), the Swedish retailer founded in 1947 is one of the largest clothing manufacturers in the world.

The company's success relies mainly on its internal organization, which consists of a buying office (BO) delegating tasks to 20 production offices (POs) located in Eurasia (H&M Group Website, n.d.). The POs are in direct contact with over 800 suppliers, with which they negotiate on costs for production contracts, as the company does not own any production plant. This technique allows the brand to benefit from the cheapest prices, as suppliers bet for the contract and the lowest production costs offered wins. Eighty percent of the brand's suppliers are located in Asia, of which half in China, while the remaining come from Europe (Agrell, 2019).

To minimize inventory and associated costs, H&M developed a performant IT network to improve and promote communication between the BO and the POs, resulting in better management of production, distribution and inventory (Tun, 2019).

Supposedly, the POs also perform sustainability audits of the suppliers, but as it is in their best interest to get the contract signed, it is safe to conclude that these audits are, at least to some extent, biased.

The POs also coordinate distribution from the suppliers to a central distribution center in Europe, or regional ones in America and Australia. All products are labelled and packaged and then shipped to regional distribution centers. From there, stores are restocked on a daily basis (Agrell, 2019).

Contrary to Zara, which uses barely any marketing, H&M engages in heavy marketing campaigns with well-known models and catchy themes and mottos. Not only is the brand releasing new campaigns for each of its capsule collections with famous designers, recently H&M has also focused on sustainability with campaigns such as H&M Conscious, emphasizing the use of organic cotton. Yet, the green image the brand is trying to build is not coherent with their way of doing business. Indeed, their speed of growth, low prices, supplier network and raw material sourcing are all factors that indicate the heavy environmental and social footprint the brand is leaving on the planet (Faure, 2018). Moreover, the brand launched in 2013 a “Fair wage” campaign, promising that all workers would receive a decent living wage. Yet investigation led by the “Labour Behind the Label” organization in Cambodia demonstrated wages were still not enough for people to “live with dignity”. Actually, the research shows that a new production system forced employees to work more than usual, decreasing the quality of work and impacting their health (Labour Behind the Label Website, 2020).

The two company examples described here-above lay down the ground for the next section of this thesis, discussing the externalities that result from the fast fashion model.

1.4 The Consequences of the Fast Fashion Model

In his book “The dirty side of the garment industry” (2016), Nikolay Anguelov explains that there used to exist a differentiation between luxury clothes and mass markets. Yet today, customers are able to dress with stylish, high-quality clothes, at very low prices, and to change their wardrobes several times during the year. In fact, today people wear on average only 7 times a piece of clothing before disposing of it (Chua, 2019).

This phenomenon is not without consequences, as the low prices paid by end customers is counterbalanced by other environmental and social costs. Additionally, discarded goods result in large amounts of waste. This section will discuss in further details the externalities resulting from the fashion industry's linear model.

Environmental Damage

In the fashion industry, environmental externalities can unfortunately occur anywhere in the supply chain, from the sourcing of raw material such as cotton, to the production of garments, to the use and disposal by customers (Anguelov, 2016). Moreover, due to the common practice of environmental sourcing[1] by multinational companies (MNCs), businesses can avoid environmental regulations rather easily, therefore further increasing their impact on our planet and society.

Each year, the clothing industry consumes around 79 billion cubic meters of water (UK House of Commons, 2019). Furthermore, the industry heavily pollutes the water it uses, due to several procedures (Anguelov, 2016):

— The agricultural process of growing cotton requires the use of pesticides and other chemicals to maintain the crops, as well as important amounts of water (Perry, 2018).

— Cotton is bleached and mercerized before it is woven into fabric. These two processes require a large quantity of toxic products, as both consist of dipping cotton into baths of chemicals.

— During the weaving process, the fabric is covered with starch to make it stronger. Once again, this results in polluting waters that are then dumped into clean watercourses. If the goal is to create a poly-blend fabric, an extra process of blending cotton with synthetic fabrics is necessary, which again requires heated water that is then released in nature.

— Next, fabrics usually go through other wet processes to stiffen the starch and enhance the quality of the textile.

— Finally, textiles are dyed using additional chemicals. As a matter of fact, textile dyeing is the second-largest water polluting-activity in the world.

The wet-processes described above are responsible for the biggest environmental issues caused by the fashion industry, and 20% of industrial water pollution worldwide (Ellen MacArthur Foundation, 2017).

[1] Environmental sourcing is the location of foreign firms in nations with lax regulatory environments in order to benefit from lower or nonexistent environmental regulation that enable businesses to discard costly pollution-mitigating technologies. (Anguelov, 2016)

The amount of chemicals used throughout the above-mentioned processes depends on the quality of the textile desired. The higher the expected quality, the more chemicals will be used during the making of the fabric. According to the World Bank, less than 60% of the chemicals emitted can go through a purification process, which decreases the level of toxicity (but does not bring it down to 0) (Anguelov, 2016).

It is also worth noting that most of these methods are usually inefficient, as around 15% of the products and chemicals used are lost in the process, as well as considerable amounts of water (around 200L of water for 1 kg of fabric) (Anguelov, 2016).

Yet, water pollution unfortunately does not happen only during the production of clothes. Indeed, laundry detergents have been said to be some of the most toxic substances to marine wildlife (Herrero Rodriguez, 2017). Moreover, as polyester, nylon or acrylic textiles are washed in washing-machine, they unleash small particles of plastic that ultimately end up in the ocean. Approximately 500,000 tons of plastic microfibers enter the ocean every year. Some of these microfibers get ingested by micro-organisms that ultimately end up in our plates. Therefore, the fashion industry does not only have a negative impact on the oceans' ecosystems, but ultimately, on our own health! (Ellen MacArthur Foundation, 2017).

Fast fashion has made clothes seem disposable (Perry, 2018). By promoting overconsumption, retailers encourage customers to buy and discard garments in a way they were not used to before. As retailers renew their offering ever so often, it becomes a habit to refurbish one's wardrobe to follow the trends. In fact, clothing utilization has decreased by 36% in the last 15 years (Ellen MacArthur Foundation, 2017). Once the trend is over, clothes are disposed of and usually end up in landfills. The United States export over 500,000 tons of old garments to developing countries in Africa and Asia, where policies on waste management lack tragically. Globally, around half of the clothing produced by fast fashion brands is thrown away in a year or less (Ellen MacArthur Foundation, 2017). Moreover, as prices are so low, it becomes cheaper and more convenient to buy new than to repair old garments, therefore further increasing the incentive to buy. Due to the internationalization of fast fashion brands, the problem has become a global one (Anguelov, 2016).

As already mentioned, the growth of non-organic cotton is polluting as a lot of chemical fertilizers and pesticides are used to speed up the process (Karaosman, 2016; Herrero Rodriguez, 2017). The United States are responsible for a large part of the growth of cotton, along with developing countries such as China, India and Brazil. These countries are trying to attract investors by lowering their environmental regulations, in order to encourage farmers who want to avoid paying environmental taxes to source their raw materials

there, which results in even more pollution of soils (Anguelov, 2016). Usually, pesticides are washed out of soils and end up in rivers, further polluting clean waters. Fertilizers can also have a negative impact on the health of farmers and local communities (WWF, n.d.). Additionally, the agriculture of crops demands significant amounts of water. Indeed, it has been estimated by Ecowatch that around 5000 L of water are necessary to produce a t-shirt and a pair of jeans (Herrero Rodriguez, 2017).

A less documented issue concerns biodiversity loss. Due to the popularity of fur in the clothing industry, each year over 30 million animals are killed in Europe, the largest producer of factory-farmed fur. Contrary to the popular belief, fur is not a by-product of the meat industry, animals are raised and killed solely for their fur (Karaosman, 2016). Moreover, the pollution of water and soils destroys ecosystems, depriving animals from their natural habitats (Brooks, 2015).

The logistic aspect of the supply chain in the fashion industry is also responsible for some environmental damages, mainly through the emission of carbon dioxide. In fact, CO2 emissions due to clothing and footwear-related transports represent 8.1% of greenhouse gas emissions worldwide (Chua, 2019). This percentage is due, among others, to the absurd fact that 80% of the cotton grown in the US is sent to other parts of the world for garment manufacturing, and then sent back to the US (Anguelov, 2016). As American farmers benefits from important subsidies, they have a cost-advantage over their competitors, and can price their cotton much lower. Therefore, a lot of multinationals prefer sourcing their cotton in the US, rather than in another country closer to home (Anguelov, 2016). Additionally, the growth of e-commerce and related shipping of goods is further contributing to air pollution (Herrero Rodriguez, 2017).

CO2 emissions from the fashion sector are also due to the considerable amount of textile disposed every year by Westerners, which even though initially dumped in recycling or charity bins, usually end up being shipped or flown to Africa (Anguelov, 2016). According to the Ellen MacArthur Foundation, in 2015 the fashion industry was accountable for the emission of 1.2 billion tons of CO2—this represents more than the emissions of all flights and maritime shipping combined (Ellen MacArthur Foundation, 2017; UK House of Commons, 2019).

Social Consequences

As fashion retailers aim at reducing prices further and further, they seek to outsource labor-intensive tasks to developing countries, where labor is cheaper. As a result, today, fifteen countries produce 90% of global textile exports, and 80% of global clothing exports (Ellen MacArthur Foundation, 2017). Workers in these

factories can endure terrible standards of working and living, due to the pressure put by clothing multinationals on all parts of the supply chain to reduce costs and retail cycles.

Firstly, the clothing factories in Asia usually make workers stay in longer than acceptable. This results mainly from the fact that the practice of overtime is very common in the industry to manage production peaks. The schedule workers sometimes have to follow has even been recognized by English corporate leaders to be similar to "modern slavery" (UK House of Commons, 2019).

According to the Universal Declaration of Human Rights by the United Nations, a living wage is a human right. Yet, when working in a garment factory, the pay is too often ridiculously low (ILO, n.d.). Indeed, workers in Bangladesh and Sri Lanka are paid almost 10 times less than their American counterparts (Lu, 2017). These salaries are only between 44% and 65% of the average salary in the country. Unfortunately, over 90% of workers are not able to negotiate their wages, mainly due to the fact that union organization is difficult and union membership not appreciated by employers (Merk, 2010; UK House of Commons, 2019). The creation of unions is made difficult mainly because of how fragmented the fashion industry is: brands usually spread work over several countries and production sites, adopting a "divide and rule" strategy that crucially decreases the workers' bargaining power. Moreover, global brands' threat to relocate in case of actions taken by workers or the government further discourage any initiative that could bring better standards of living. (Merk, 2010) Due to the outrageously low wages that these factory workers are paid, the fashion industry has actually contributed to the poverty gap (Lu, 2017). Unfortunately, this situation does not look like it will improve soon, as the purchasing power of global brands allows them flexibility in terms of supplier choice and negotiation power. This enables them to reduce their selling prices, which results in an increase in market share, and a pressure on competitors to adopt the same technique (Merk, 2010).

On top of the wage struggles, our capitalist society encourages imports from fast fashion giants in Southern countries, at the expense of local production and the expansion of local businesses, making it even more difficult for bottom of the pyramid countries to develop. Indeed, second-hand clothing from big brands being way cheaper than local garments, the population in Africa, a big part of which cannot afford to spend on clothing, will go for the cheaper option (Brooks, 2015).

Additionally, as companies outsource the labor-intensive tasks to Asia, big brand managers usually do not pay attention to the conditions in which their (indirect) employees are working. As a result, the Asian factories' managers do not invest in costly building maintenance, resulting in unsanitary and dangerous

workplaces, which do not comply with regulations (Anguelov, 2016). Furthermore, local politicians usually encourage the speed up of factory constructions and disregard safety regulations (Taplin, 2014). Death due to fire or building collapses are frequent (ILO, n.d.). A well-known example of this unfortunate reality is the Rana Plaza tragedy. On April 24, 2013, the Rana Plaza building in Dhaka, Bangladesh, collapsed. This building was sheltering five clothing factories. More than 1,100 people died, and over 2,500 were injured during the incident. The victims were mostly women. This incident is now the symbol of a fashion industry that "exploits, destroys and kills" (Drouelle, 2018).

The "Fashion Revolution" campaign was founded in response to this incident, with as main message the idea that the Rana Plaza collapse is the direct result of the way the fashion industry operates and of the lack of transparency from these operations (UK House of Commons, 2019). Following this event, the "Accord on Fire and Building Safety" was signed by several brands and factories to improve workplace maintenance and enforce standards to provide a safe working environment in the fashion industry (Accord on Fire and Building Safety in Bangladesh, 2018). Yet, today most signatories are far behind the implementation schedule (UK House of Commons, 2019), reflecting the lack of importance and consideration that companies attach to the safety of their suppliers.

Next, some processes are dangerous to workers. For example, spinning can create noises up to 100db, while the highest safety limit is 85db. It is not unusual for workers to catch diseases due to their work tasks or environment (ILO, n.d.).

Additionally, some workers are exploited and child labor is sometimes adopted (ILO, n.d.). Forced labor is still existing in the fashion industry. For example, in Uzbekistan and Turkmenistan, citizens are forced by their governments to harvest cotton every year, sometimes under very difficult circumstances (UK House of Commons, 2019). According to Hakan Karaosman (2016), the Forced Labor Index has identified 49 countries as "extreme risk", among which many are the main suppliers of garments for fast fashion retailers.

Yet, fashion companies do not only harm the lives of their own workers, as some environmental externalities have transformed the lands and cities where these factories stand into gigantic trash bins. Wastewater and other waste end up in rivers or dumped in landfills in cities, increasing pollution and decreasing quality of life of all the people living there.

Chapter 2: The State of the Fashion Industry Today, the Green Movement and the Need for Sustainability

2.1 The State of the Fashion Industry

The fashion industry today is facing several main challenges.

Firstly, China's role is becoming more and more important in the industry, therefore players need to pay attention not to become over-reliant on the country, and must start to better mitigate risks by spreading to other promising regions (Amed et al., 2019).

Secondly, the industry's growth is slowing down, putting pressure on companies to stay relevant so as to avoid losing market. To do so, businesses must address three prominent customer needs: a better communication through social media, an increased focus on convenience, and concrete actions towards sustainability (Amed et al., 2019).

The recent Covid-19 crisis has intensified this set back as the risk of contagion forces countries to close their borders, and people to stay home, therefore critically impacting the global economy (Pallini, 2020). Businesses with long, global supply chains such as Fast Fashion brands are especially impacted by this situation, as they were built on international production and trade networks (Seric et al., 2020). The fashion sector has been strongly hit by the crisis, as companies end up with large quantities of unwanted clothes on hand (Huet, 2020).

Lastly, the world has recently witnessed a rising interest in the protection of the environment and of society, mainly due to several calls to action resulting from global warming and the worsening climate crisis. This phenomenon, commonly known as the "Green movement" actually dates back to the 18th century.

2.2 History of the Green Movement

In the 1700s already, authors and scientists discussed the potential adverse consequences on the Earth of an exponentially growing population. Yet, the industrial revolution that followed started destroying the planet, without people really paying attention nor realizing the impact of what they were actually creating: a model of consumption that drains the Earth of all its resources, to create goods that are disposed of after use. Black Swan events such as the two World Wars and the Great Depression de-prioritized the green movement.

Only in the 1950s did it flourish again, noticeably thanks to William Anders' shot of the Earth from space in 1968, that brought many people to realize the precariousness of our world and the importance of preserving it. College students and "hippies" started to raise their voices, promoting a way of living by respecting and protecting the environment. Two years later, the first Earth Day, celebration of our planet's nature, was a massive success. Followed the embodiment of this movement through the setup of public and private institutions striving to protect our planet such as the Environmental Protection Agency (EPA), as well as several new environmental laws all over the world. These new rules and organizations aimed at reducing toxic waste, raising awareness, and enforcing compliance. Yet, businesses were not in favor of these new laws, as these were impacting their revenues, especially in the raw resources industries such as fishing and mining (Lallanilla, 2018).

In the years 2000, due to global warming, a specific focus on CO2 reduction and the protection of endangered wildlife started to be emphasized. In 2009, the US passed the Clean Energy Act, aiming at reducing those emissions through the use of renewable energy such as wind or solar. The quick advances in technology witnessed during the decade enabled the use of green energy. Several initiatives for species facing extinction and rainforest protection have also been established (Brief history of the modern…, 2016).

More and more scientific reports have been published, depicting the alarming rise in temperature witnessed over the last century, the increasing melt of the ice cap, and the ever-rising number of extinct species; in short, depicting the necessity to take action. The Earth overshoot day measure has also raised awareness by showing how quickly the human population consumes one year of the planet's resources, compared to how quickly the Earth regenerates them over the same lapse of time. In 2000, the date was September 23. In 2010, it was August 7—almost 2 months earlier, only 10 years later.

The green movement of today is different from the earlier ones exactly due to this: scientific research and proof that human behavior is destroying our planet (Lallanilla, 2018).

2.3 The Need for Sustainability

The year 2019 marked the student revolution, led by Greta Thunberg, a 16-year-old teenager from Sweden suffering from Asperger syndrome. Every week for several months, students skipped school to strike for the climate, and ask governments to act (Bell, 2019). Following this call for action, more and more people have been wishing to make a difference at an individual level, adopting an eco-friendly lifestyle, buying second-

hand clothes, avoiding plastic and consuming food from bulk shops. The Earth overshoot date has been advancing at a slower pace in the last decade, proof of the actions taken to reduce consumption and negative environmental impacts. Yet, this date should not be coming closer, but further away from the beginning of the year. Still a lot needs to be done to achieve a sustainable way of living.

Along with this personal wish to make a change comes a shift in people's expectations in terms of what they buy and consume. More and more customers are switching away from their favorite brands to some more sustainable, eco-friendly options, which has forced companies to adapt their offering to the new demand (Gray, 2006). Yet, some believe that we cannot count on individual choices to change this worldwide problem, as it is difficult to trust that people will make the rational choice every single time (Brooks, 2015). Indeed, this would necessitate individual customers to significantly lower their personal consumption and to research every single piece of clothing they buy, but also businesses and governments to buy ethically when they purchase clothing. Finally, for many of the Southern populations, which are usually poorer than the Northern ones, buying ethically is simply a luxury they cannot afford (Brooks, 2015).

In our capitalist society, MNCs are the major players. Therefore, an increasing number of people believe that they also have a major role to play in reversing the environmental crisis we are witnessing. This responsibility is most commonly referred to as Corporate Social Responsibility (CSR) (Anguelov, 2016). In the garment industry, the wish for sustainable clothing is also existent. Yet, the appeal of low prices and the pressure to follow fashion trends seem to still be prioritized over sustainability at the moment (Anguelov, 2016).

Due to this shift in customer expectations, companies had to react. The Kering Group for example, has established the G7 Fashion Pact, an agreement signed by 32 companies that pledge to take action towards climate change, ocean protection and endangered species (Chua, 2019). The Kering Group's initiatives will be discussed further later on. Multinationals have created their own sustainable policies, establishing requirements for supplier selection, operations management and so on. Some also engage in green investments, especially in technology and innovation, to improve their activities' impact on the planet. NGOs and other environmental associations have also drafted some guidelines for corporations to follow (Anguelov, 2016), such as the ISO20400 standard on sustainable procurement.

Actually, the compliance to sustainable rules and the innovations towards a greener business model also answers business demand for new opportunities, such as economic growth and cost savings, new job creation, and increased innovation (Ellen MacArthur Foundation, 2015).

Yet, some companies also use the green trend to boost their sales, while actually not doing anything to reduce their environmental impact. These businesses are voluntarily leading their customers to believe they are performing well on an environmental and societal level, whereas they are simply trying to increase revenues by misleading them. This is commonly referred to as "greenwashing", which is the intersection of two behaviors—poor environmental performance and positive communication about environmental performance (Delmas & Burbano, 2011).

In order to offset these fraudulent practices, and to accelerate the shift to a sustainable way of doing business, many believe that governments should step in. Indeed, action from the government is necessary in order to establish corporate standards and regulations that can be enforced by law (Anguelov, 2016; Zadek, 2012). In Europe, standards and regulations specific to the fashion industry have already been implemented. The European Apparel and textile Confederation (EURATEX), representing the interests of clothing and textile manufacturers in Europe, has developed frameworks and guidelines to help companies transform their businesses (Euratex Website, 2019).

Yet, each EU member remains free to implement specific environmental laws (or not). In Germany for example, the Eco-Tex Standard aims at evaluating textile quality from an environmental point of view. More recently, this country has also launched the "Grüner Knopf", the Green button initiative; a certification of sustainability for products and companies with strict requirements to meet and guidelines to follow (Hardinghauss, Süss & Schonhofen, 2019). However, Spain and Italy, which are home to most of Europe's apparel manufacturing, are less involved in developing legal regulations (Anguelov, 2016).

In the United States, the Securities and Exchange Commission (SEC) has declared in 2018 that companies had to disclose any climate-risk (i.e difficulties to meet emissions requirements) as these were now considered material to investors (The United States Government Accountability Office, 2018). The EU council has also started to develop such initiative, requiring investors to declare how environmental and social risks were to be included in investment strategies in the future, in order to reduce greenwashing behaviors (Rust, 2019).

To guide governments and businesses towards a more sustainable way of conducting operations, the United Nations (UN) has developed in 2015 the 2030 Agenda, which lists and describes a set of sustainable development goals (SDGs) that tackles the current environmental and social issues. The European Union has integrated all 17 goals in its commission's 10 priorities in 2016 and has developed a strategic approach to achieve those (EU Commission, 2017). For the fashion industry to follow these rules, the UN Fashion

alliance was created to encourage collective involvement and coordinated actions from UN bodies active in the sector. Initiatives to meet the SDGs' targets include the establishment of policies and the development of projects (UN Fashion Alliance, n.d.).

The Sustainable Apparel Coalition is another alliance which aims at improving the environmental and social impacts of the fashion industry, by for example developing the Higg Index, "a suite of tools that enables brands, retailers, and facilities of all sizes—at every stage in their sustainability journey—to accurately measure and score a company or product's sustainability performance" (The Sustainable Apparel Coalition Website, n.d.). Other movements aim directly at improving one aspect of sustainability in the fashion industry, such as the "Labour Behind the Label" campaign which fights for the improvement of standards of work and life.

Progress is happening, but not fast enough. It is necessary for governments to develop standards and regulations in order to hold accountable companies that do not take steps to become more sustainable, as well as to create transparency for stakeholders worldwide (Global Sustainable Standards Board, n.d.).

Chapter 3: Alternative Business Models

3.1 The Sustainable Business Model Archetypes

Some companies are already shifting away from the linear model of production, trying to become more sustainable by modifying their processes, or taking into account externalities and their costs.

As such, in 2014, Bocken et al. have developed a framework to categorize sustainable business models (SBM), which they define as models that "incorporate a triple bottom line approach and consider a wide range of stakeholder interests, including environment and society". The goal of this framework is to create a terminology that will contribute to the evolution and the implementation of SBMs in both research and practice.

The authors have categorized the different sustainable initiatives that are cited in literature to form three main groups: technological, social and organizational, representing the three main types of innovation, according to them. Each group consists of several archetypes.

- The technological cluster refers to innovation in production, such as manufacturing processes or product design.
- The social group represents people-centric innovation, related to both consumers and workers, such as new offerings and adaptation to the changing customer behavior, as well as fair trade initiatives.
- Finally, the organizational grouping includes innovation of the vision and the mission of the company.

The diagram below depicts the framework previously explained.

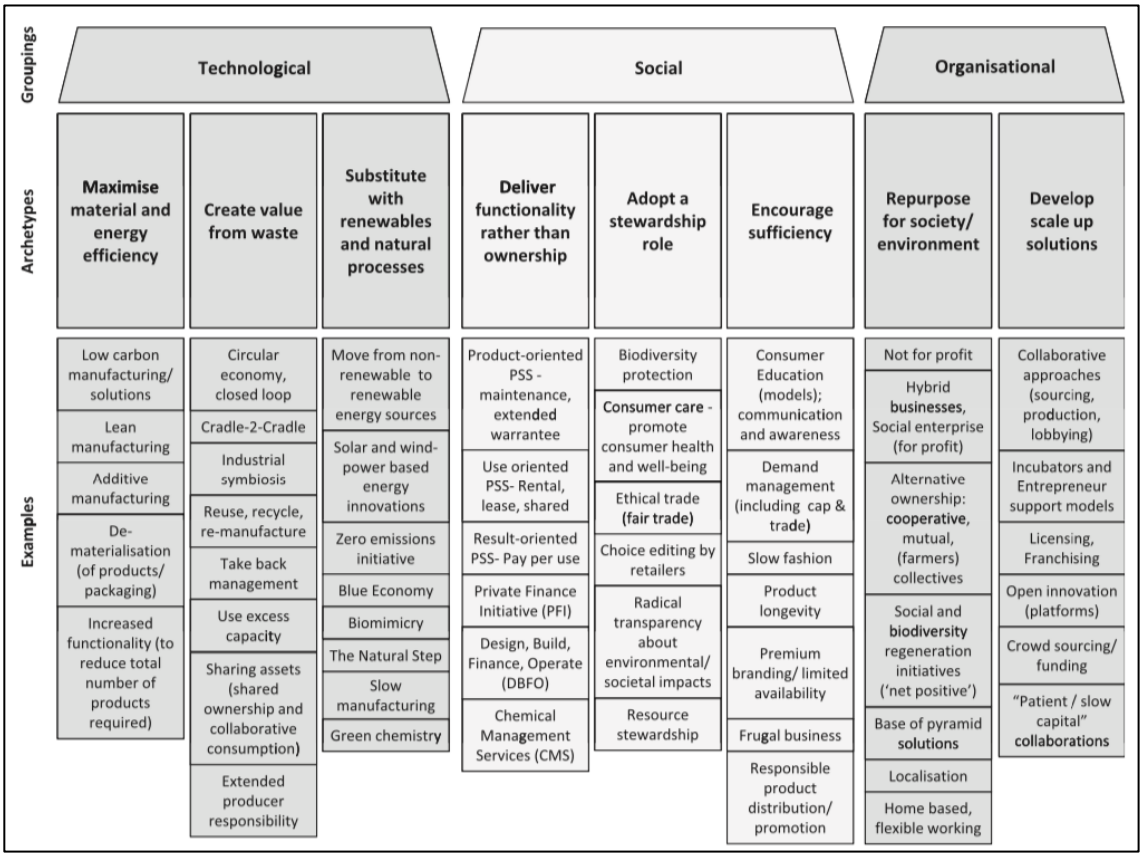

Figure 1 — The sustainable business model archetypes (Bocken et al., 2014)

The rest of this section will present three companies which have implemented a sustainable business model. All of the following businesses' efforts fall under Bocken et al.'s SBM archetypes, demonstrating the relevance of this framework to the fashion industry.

3.2 The Case of Puma

Puma was the first fashion retailer to include environmental costs in its profits' computations (Beavis, 2012). Through its Environmental Profit and Loss account (EP&L), the company aims at measuring all externalities it is responsible for along its entire supply chain. It has therefore adopted a stewardship role, as defined by Bocken et al. (2014). The goal of this initiative is to become more transparent, and to make everyone, industry insiders or not, realize that nature's resources are finite and should not be considered free. Moreover, a company's impact on the planet can also have financial costs for the business, and becoming

more sustainable helps in reducing them (Anderson, 2011). By putting a cost on its environmental impact (use of resources and negative impacts on the environment), Puma has identified the tasks that are the most damaging to the environment: 6% of costs were traced back to Puma's direct operations, 9% to its first-tier suppliers, and 85% to its second, third and fourth tier suppliers (Beavis, 2012), totaling €145 million (Puma: environmental profit…, 2012). To tackle impacts resulting from raw material extraction, Puma has partnered with several bodies and organizations such as the Better Cotton Initiative and the Leather Working Group. It has also engaged in supplier training to increase resource efficiency (Puma Website, n.d.). Finally, the EP&L also allowed Puma to cluster impact by region, product lines and raw material, identifying respectively Asia, footwear and leather, as the most impactful (Beavis, 2012). The brand is committed to reduce its EP&L account every year as part of its 10FOR20 strategy (Puma Website, n.d.).

Puma has also derived, using a sustainable scorecard, a set of goals to be achieved by 2025, among which water use, energy, CO2 emissions and waste reduction, as well as making sure that at least 50% of its products are made from more sustainable materials—these efforts falling under the technological grouping from Bocken et al. Additionally, the company launched green projects such as the creation of the Puma Re-Suede, a sneaker made of recycled resources from scrap fabric that is produced using 80% less energy and CO2 emissions than for regular sneakers. (Beavis, 2012)

Implementing sustainable initiatives will likely help Puma to thrive in the future, as customer demand is shifting for sustainable products, and governments are establishing more and more rules. The brand is a strong believer that sustainability will turn into a competitive advantage and is therefore imperative to strive for.

3.3 The Case of the Kering Group

The Kering Group, which Puma was a member of for several years before being partly sold by the group to its shareholders (Luxury group Kering trims…, 2019), is another initiative that has gathered several luxury fashion houses such as Gucci, Saint Laurent, Bottega Veneta, Balenciaga and Alexander McQueen. The group has several goals, among which encouraging and promoting a sustainable approach to fashion. Kering strongly emphasizes innovation in terms of design as well as production development, stimulating progress in sustainability. This is captured in their slogan "Empowering Imagination". The group is making steps towards sustainable production by providing eco-friendly raw material and resources, defending women's

rights and establishing decent working conditions, as well as sharing their best practices. These efforts fall under the technological and social clusters from Bocken et al.'s framework.

The Kering Group strategy is based on three pillars: care, collaborate and create, which are the means to achieve its 2025 Sustainability Strategy (Kering Group Website, 2020):

- Care: This pillar represents the idea of protecting the environment and the society through innovative techniques and with the help of new regulations. The group aims at reducing the environmental footprint of the products it is manufacturing, by using sustainable raw materials and modifying its production and distribution processes. Its goal is to reduce its global Environmental Profit and Loss account by 40%, and its CO2 emissions by 50%, for the year 2025. Since 2018, Kering has implemented a carbon neutrality policy, through which all GHG emissions are offset. The group also develops new ways of creating fashion by preserving water, reducing waste and the use of land, and implementing those in its brands' different production plants.
- Collaborate: Kering emphasizes good relationships with all its stakeholders, business-related or not. It stresses the importance of employee well-being, as well as transparency with suppliers. It has developed a Code of Ethics which includes a section specific to suppliers, to increase sustainability in the upstream steps of the value chain (Pavione, Pezzeti & Dall'Ava, 2016). The group also aims at maintaining good relations with the local communities it impacts.
- Create: This last pillar relates to the wish of innovation and change towards a sustainable future. The Group believes that in order to achieve this long-term vision, knowledge sharing is necessary. Kering is therefore fully transparent about the new techniques it develops, through an open source approach and collaboration with universities and small companies. The Material Innovation Lab created in 2013 perfectly illustrates this wish for technology and innovation. The goal of this new facility is to research sustainable fabrics and textiles and to encourage their use within the different luxury houses.

The 2025 Sustainability Strategy is implemented by a strong corporate governance, through several bodies such as the Comité Développement Durable, the Sustainability Technical Advisory Group, and the Comité d'Éthique (Pavione, Pezzeti & Dall'Ava, 2016).

In August 2019, the Fashion Pact was created during the G7 summit in Biarritz, in response to the UN's Sustainable Development Goals. The goal of this pact is to unite fashion firms in committing to conduct operations in an ethical, eco-friendly way, particularly focusing on the climate, oceans and biodiversity. The

pact aims to represent at least 20% of the fashion industry worldwide, and to count within its members all types of brands, from luxury to affordable ones. Members of the pact commit to achieve the same specific goals and quantitative targets, but can choose the means to do so. The pact emphasizes especially the "first mile" of the supply chain, meaning mainly raw material extraction, as this task is responsible for a large part of environmental externalities, and remains unaddressed (The Fashion Pact, 2019).

3.4 The Case of Patagonia

Patagonia is a pioneer in sustainable clothing and has to be mentioned in this section. It is the most famous example of an organizational archetype, as the company has shaped its whole business around the achievement of sustainability. Yet, its efforts are varied and fall under all three categories from Bocken et al.'s framework.

Patagonia is essentially a sportswear brand aiming at addressing the environmental and social crisis. It started as a small company providing tools for climbers and has grown to become a $550 million revenue company. Patagonia is registered as a benefit corporation, meaning it uses part of its revenues to support society and the environment. In this case, the company donates 1% of its revenues to NGOs fighting against global warming (Patagonia Website, 2019).

Yet, Patagonia does not stop here. It is implementing values of respect of the environment and society in its whole supply chain, along with high-quality garments and the importance of community (Keefe, Milam & Woodward, 2013). "At Patagonia, the protection and preservation of the environment isn't what we do after hours. It's the reason we're in business." (Patagonia Website, 2019).

The company has built its brand without barely any marketing, the high-quality garments and the values they stand for doing them the best publicity (Keefe, Milam & Woodward, 2013; Rogers, 2018). In order to ensure the full control over the company's vision and mission, Patagonia has remained a private company and is therefore not traded on the stock exchange (Ritala et al., 2018).

Here are some of the main initiatives created and followed by Patagonia to create sustainable clothing:

In 1994 and after a full life-cycle assessment of the impacts of the use of natural fibers on the environment (Chouinard & Brown, 1997), the brand decided to switch to organic cotton, which had a critical impact on

their supply chain (Noe, 2018). Indeed, as many of their initial suppliers refused to follow the brand on its journey to sustainability, they had to find different suppliers, and there were not many options out there (Chouinard & Brown, 1997). Eventually, due to the lack of enthusiasm and interest from upstream actors, the brand decided to develop its own organic cotton supply chain, including farmers, spinners, knitters, weavers and dyers, to ensure 100% organic cotton (Patagonia Website, 2019).

Patagonia has been developing Fair Trade certified styles for over 5 years, ensuring 50,000 workers a premium, which they can decide how to spend. For example, workers in VT Garment, Thailand, used their premium to ensure education to 265 children. In Sri Lanka, employees at Hirdaramani-CKT Apparel created a day-care center to enable them to bring their children at work. They used the remaining money to create a health and hygiene program. These are very tangible examples of how ensuring Fair Trade production can impact the workers' lives (Patagonia Website, 2019). The company builds long-term relationships with its suppliers in order to create trust within the parties and make sure that they respect the company's overall engagement and core values (Keefe, Milam & Woodward, 2013).

It is also carrying out a circular economy-like structure, where customers can send back any item purchased for repair, to avoid overconsumption. They also published some resources online to enable customers to repair their own garments by themselves, through the Fixit platform (Bocken & Short, 2015).

Furthermore, the company has launched a "Worn wear" line, which is a line of clothing pieces created from used Patagonia garment (Noe, 2017). The brand also created a partnership with eBay to encourage customers to sell the garments they do not wear anymore (Bocken & Short, 2015). Additionally, customers bringing in their old pieces of clothing get some vouchers to spend for new articles (Patagonia Website, 2019).

The brand also tries to raise awareness of overconsumption and reminds people to buy only what they need, namely through their "Do not buy this jacket" advertisement, which goal was to make customers think twice about the necessity to buy new garments (Bocken & Short, 2015)

The company is aiming at using only recycled and renewable raw material, in order to reduce waste. To achieve this goal, they have been using fibers made from consumer waste, such as old pieces of garments found in landfills and textile-collection bins (Chavan, 2014; Patagonia Website, 2019). The company partnered with textile firms such as Teijin in Japan, which own a recycling facility, to introduce the use of recycled polyester in its supply chain (Chavan, 2014). Recycled nylon, down and wool are also used to

produce their garments. This process also drastically reduces the amount of CO2 resulting from the production of textile (Patagonia Website, 2019).

Through these initiatives, Patagonia is not only contributing to improving the life of its workers and impacting positively the environment, but it has also benefitted from a sustainable reputation. As the interest towards sustainable garment production has been rising, the brand is benefitting from growth every time it broadens its social mission (Beer, 2019).

3.5 Coronavirus and Sustainability

The Covid-19 pandemic is hitting the industry in unexpected ways. In an update of the McKinsey "State of Fashion 2020" report, the authors mention they are expecting "a large number of global fashion companies to go bankrupt in the next 12 to 18 months" (Amed et al., 2020). As demand has dropped and stores have closed, large quantities of inventory are remaining on hand for the retailers, which could result in dramatic financial losses (Cosgrove, 2020). This situation forces the main actors to rethink their way of operating (Chua, 2020).

One of the solutions to recover from this inventory crisis would be to recycle the already produced garments and reuse the fabric as raw material for a new collection (Huet, 2020), or simply to sell the 2020 collection next year (McIntosh, 2020). Hopefully, the fast fashion companies currently dealing with these issues will take this opportunity to think more critically about their business models, and shift to a more sustainable way of doing fashion (Magnusdottir, 2020).

> *"I think it [the Covid-19 pandemic] is an opportunity for all of us to look at our industry and to look at our lives, and to rethink our values, and to really think about the waste, and the amount of money, and consumption, and excess that we have all indulged in and how we really need to rethink what this industry stands for."*—Anna Wintour, April 22, 2020

Chapter 4: The Circular Economy Model and its Application to Fashion

4.1 The Circular Economy Model

The circular economy model is the complete opposite of the linear model. As the noun indicates, circular economy denotes “an industrial economy that is restorative by intention and design” (Ellen MacArthur Foundation, 2013).

Due to the growing concerns over resource scarcity, GHG emissions and environmental and social protection, mentalities are evolving to consider materials as finite resources that must be preserved (Stahel, 2016). The circular model supports this shift as it aims at producing with a minimal amount of raw materials, prioritizing the recycling of already used resources from goods that are not used anymore.

To achieve this, production has to be thought of differently, as the ease of reusing the products created has to be taken into account. Moreover, a circular model aims at being sustainable also by respecting workers and emphasizing the use of green energy for production, logistics, distribution and so on, in order to reduce all environmental and social footprint (Ellen MacArthur Foundation, 2013). The idea of this model is, therefore, the creation of a closed loop economy where a minimum amount of new material is brought in and barely no old resources are thrown away (Stahel, 2016).

The concept of circular economy has origins from several disciplines (Ellen MacArthur Foundation, 2013):

- Biomimicry: it is the idea of inspiring ourselves from nature to solve humanity’s problems. The concept was introduced to the mass public by Janine Benyus, who defines biomimicry as “a practice that learns from and mimics the strategies found in nature to solve human challenges and find hope along the way” (The Biomimicry Institute, 2020).
- Cradle to cradle: as opposed to “cradle to grave”, it is the idea that the waste of something becomes the resource for something else.
- Regenerative design: the idea that we should considers living “within the limits of available renewable resources”, without having any sort of negative environmental impact.
- Performance economy: an economic model introduced by Walter Stahel, that is based on extending the life of products and preventing waste. It emphasizes the idea of a shared economy where products and services are rented instead of bought and then discarded. (Stahel, 2016)
- Think in systems: Feedback systems that enable evolution and usually result in outputs that are more important than the inputs.

— Waste is food: The biological nutrients present in produced goods can be reintroduced back in the biosphere to nurture the Earth. Technical nutrients can also be recovered and transformed for further use in a process called upcycling.

The goal of the circular model is, ultimately, to enable production while respecting the capacity at which the Earth can renew its resources (Ellen MacArthur Foundation, 2013).

The figure below depicts three methods that should be applied in order to implement circularity:

— The use of renewable resources and controlled use of finite ones.
— The different paths that biological and technical components should follow to be (re)-used to their maximum capacity.
— The mitigation and management of externalities.

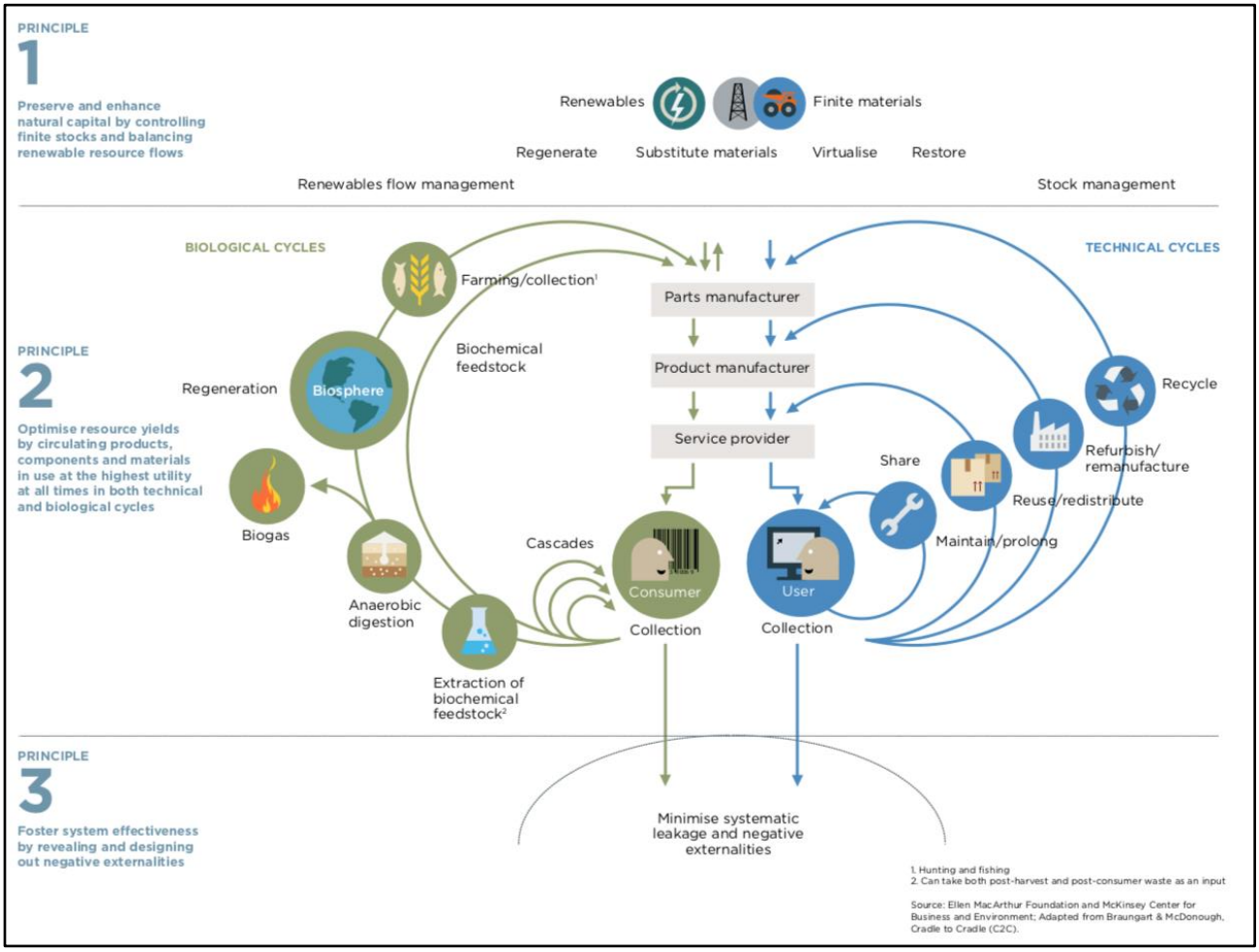

Figure 2 — The circular economy model (Ellen MacArthur Foundation, 2013)

Innovation is key in enabling this new model. Indeed, the whole supply chain has to be reinvented so as to modify the raw materials used, the way goods are produced in order to ease disassembly and recycling, the way goods are consumed, and how they are disposed of (Ellen MacArthur Foundation, 2013).

This new economy is built on the idea that continuous flows of materials will circulate in the value chain: the biological nutrients should re-enter the biosphere, and the technical nutrients should remain in usage continuously without entering the biosphere. Treating material flows in this way will enable the model to become truly circular (Ellen MacArthur Foundation, 2013).

Goods, once they have been used, can either be repaired or remanufactured to extend their use, or transformed into entirely new products using the used materials as new, raw resources (Stahel, 2016). To do so, markets for used and shared resources must be created, to help the flow circulate in the system. Synergies between companies must also be leveraged, in order to reduce resource waste (SPF Economie, 2019).

> "*Circular economy would change economic logic because it replaces production with sufficiency: reuse what you can, recycle what cannot be reused, repair what is broken, remanufacture what cannot be repaired."*—Walter Stahel (2016).

The circular economy model also emphasizes the idea of goods as a service: renting instead of selling (Accenture, 2014; Buchel et al., 2018). In a perfect circular model, companies would retain ownership of their goods, and sell them as services, to avoid one-way consumption. This is for example the case of a laundry or photocopy service: individuals do not buy one laundry machine or photocopy machine, but instead pay for the service at a shop that "rents" their use to the public.

Unfortunately, the current model does not encourage this leap to an entirely new economy, as resource prices remain lower than labor costs. The circular economy model emphasizes the use of human labor over finite resources, but there is no apparent financial incentive to change. Yet, economic benefits of switching to this sustainable model could be rather important. In fact, improving production in manufacturing sectors could result in cost savings between $340 and $630 billion per year, for Europe only (Ellen MacArthur Foundation, 2013).

4.2 Circular Economy in the Fashion Industry

According to a report by the Ellen MacArthur Foundation published in 2017, there are 4 main steps to follow in order to implement circular economy in the fashion industry.

The first one is to "phase out substances of concern and microfiber release". This step relates to removing all unsafe elements from textiles and garments production for the sake of eliminating the environmental externalities caused by the manufacture, use and disposal of clothes. Indeed, chemicals and other non-natural substances are present in almost every step of the value chain: from cotton growth, to dyeing processes, to the use and washing of clothes (Bucklow, Perry & Ritch, 2017).

Next, the industry should focus on creating clothes that are designed to last, using high-quality materials to get rid of the "disposable" aspect of clothes (Niinimaki, 2017) and increase the number of times people wear them. Introducing clothing rental and emphasizing on quality are ways to expand the lifecycle of clothes.

Furthermore, the way clothes are designed, collected and reprocessed should be radically improved to enable better recycling. Innovation in recycling processes is necessary to ease the transformation of textiles from used garments into new, ready-to-reuse fabrics, without losing material. Several innovative recycling techniques already exist, such as Ioncell-F, a chemical recycling technique for cellulose fibers (Niinimaki, 2018), or automated sorting systems, which enable faster and more efficient sorting of fabrics to improve the effectiveness of sorting processes (Buchel et al., 2018). To improve recycling outputs, the design of clothes must also be adapted (Smith & Ballie, 2017). Tools such as the Sustainable Design Cards[2] enable designers to think differently about how to create clothes in order to ease their disassembly, increase their time of use and improve their impact on the people and the environment (Raebild & Hasling, 2018). Moreover, clothing collection should become easier to achieve, more common, and more available. Unfortunately, it's not only about the supply side of recycling materials, it's also about the demand: nowadays the use of recycled resources is nor common neither popular, yet it should be encouraged to speed up the journey to sustainable production (Buchel et al., 2018).

Finally, the industry should prioritize the use of renewable resources (Accenture, 2014; Buchen et al., 2018) and make processes more efficient in order to reduce waste and the amount of materials needed.

[2] A set of cards describing sustainable approaches to the fashion industry along 6 categories: design and concept, disposal and recovery, materials, production, transport and retail, user and practice. Appendix A provides one example of a Sustainable Design card.

Additionally, by increasing efficiency, less toxic resources will be used, therefore reducing environmental externalities such as water, land and air pollution.

Examples of Circular Economy in the Fashion Industry

A concrete example of circular economy applied to the fashion industry is upcycling. Upcycling is the creation of new goods from salvaged ones in a way that increases the value of the materials (Zimring, 2016). In fashion, upcycling is the use of scrap pieces of fabric initially used for a different purpose, to create clothes without the need of new raw resources. This method is especially appealing for younger creators as working with textile scraps and offcuts can result in important cost savings (Amed et al., 2019). Moreover, it fosters creativity and out-of-the-box thinking, and the result turns out to be one-of-a-kind, unique pieces of clothing. Yet, upcycling is difficult to manage on a large scale, due to the uncertainty of supply and the variety and quantity of fabrics (Amed et al., 2019).

Another application of this new model to the garment industry is collaborative consumption, which in business translates into the rent of clothes (Niinimaki 2017; Niinimaki, 2018). More and more, platforms and websites are created to enable customers who enjoy regularly changing their wardrobe to rent and return outfits (Braithwaite, 2018). This solution allows to preserve the feeling of joy that people get when buying some new clothes, while avoiding the pile-ups of garments in wardrobes. This business model is nothing new, as it is the one used in dress-up stores, where people rent costumes for carnivals or Halloween parties, and return them the next day. Renting stores and platforms are extremely convenient for purchases that are usually not needed for a long time, such as baby clothes that can only be kept for a couple of months before they become too small for the child to wear. Some examples of these websites include Rent the Runway, Girl Meets Dress, and Happy Kiddo.

Initiatives

Ellen MacArthur established in 2010 the foundation of the same name, with the goal of speeding up the shift to circularity. It shares knowledge and insights on the new model in order to make the shift quicker and easier for industries, companies and individuals. The Ellen MacArthur Foundation published, in 2017, “A new textile Economy”—a report that discusses the environmental and social impacts of the current linear model in the fashion industry, and how to switch to a new sustainable model. The foundation continues to research innovative ways to implement circularity in fashion as well as in other industries, and makes all its reports available to the public through a free download on the official website.

Fashion for Good is another initiative which encourages the shift to a circular model of production and consumption in the fashion industry. It has created an "Innovation Platform" where knowledge and practical insights are shared to help companies take the leap to circularity. To achieve a circular model, it has developed the 5 Goods framework: good materials, good economy, good energy, good water and good lives. It is by trying to achieve these 5 goals that companies will enable the shift to a new model. The platform also shares some successful technologies and business models to inspire companies who want to make a change. Moreover, it financially supports businesses which aim to develop sustainably through different programs. Finally, Fashion for Good has created the "Cradle to Cradle Certified Products Program", which enables companies to assess the sustainability of their products and services on several aspects such as respect of society and nature, sustainability of the production, and whether the design was thought for future (re-)use. This certification is also a means of communicating to stakeholders and end consumers the efforts made by the company towards sustainability (Fashion for Good Website, 2020).

4.3 Benefits of the Circular Model

The benefits of introducing and applying the circular economy model in the fashion industry are endless and impact all aspects of the triple bottom line: profit, planet, people.

Profit

Companies would greatly benefit from cost savings by reducing the amount of resources they use (Ellen MacArthur, 2017). The term "resources" does not only refer to the raw materials used to create garments, but also to the energy consumed to produce and transport goods, the materials used to package, the chemicals used to transform the textile, and so on.

Moreover, through innovation, businesses can offer new products and services. Therefore, circular economy also means new growth opportunities (Herrero Rodriguez, 2017), as companies exercise their creativity to the benefit of sustainability.

Additionally, becoming more sustainable has an impact on one's reputation, and can ease the process of regulatory compliance, resulting in potential cost savings. Indeed, non-compliance can result in several financial penalties for a company, such as legal fees related to a potential law suit, loss of revenue due to a decrease in demand, loss of employee pool due to resignation from current employees or abstention from

candidates to apply, loss of production due to incidents related to safety or the environment, or, worst-case scenario, loss of license to operate due to a plant shut-down (Environmental Standards, 2020).

At an industry-wide level, the shift to circular economy has the potential to create a large number of jobs in recycling, re-manufacturing, design and innovation, as well as through new logistic systems and the creation of new companies (Ellen MacArthur, 2015; Herrero Rodriguez, 2017).

Taking an economic point of view, according to a survey by the Ellen MacArthur Foundation, SUN[3], and the McKinsey Center for Business and Environment (2015), Europe could increase its resource productivity by up to 3% each year by implementing circularity. This would result in primary resource benefits of €600 billion per year by 2030, and net benefits greatly superior to the current linear model's ones.

Planet

For the planet, one of the main benefits is, of course, less use of raw finite resources (Ellen MacArthur, 2015). As already explained, the Earth is currently being drained of its resources, as human productivity is faster than the planet's ability to recover. This situation is dangerous as it is compromising the balance of several ecosystems, but also because it does not allow a bright future for the next generations, who will have to live without some basic resources (OECD, 2015). By consuming less and in a smarter way, we enable a sustainable future for the world and all its ecosystems.

Secondly, a shift to a circular model will result in fewer GHG emissions (Ellen MacArthur, 2015). This will in turn slow down the climate crisis we are currently witnessing which is also harming several ecosystems all around the world.

As already mentioned, the current linear model harms the land, soils and oceans. Shifting to a circular model would enable to recover healthy lands and soils through the responsible growth of raw resources and the practices of composting (Ellen MacArthur, 2015). It would also reduce the amount of plastic in the ocean by promoting less consumption and implementing thorough recycling to avoid the practice of dumping garments in the ocean. The use of more responsible material will also drastically reduce the amount of plastic microfibers that end up in the ocean through the washing of clothes (Plastic Soup Foundation, 2020).

[3] Stiftungsfonds für Umweltökonomie und Nachhaltigkeit: The environment and sustainability institute initiated by the Deutsche Post Foundation.

Additionally, it would minimize the volume of toxic elements such as chemicals dumped in nature. This is especially important for regions where water is a scarce resource which is often polluted by MNCs' operations.

People

This new model will also benefit individuals, and society as a whole.

Firstly, by improving the quality of products, people will be able to use them longer, therefore decreasing their overall spending on clothes, and avoiding the purchase of unnecessary items.

Moreover, the reduction of pollutants' use and production will have a positive impact on people's health. The current Covid-19 pandemic has depicted the consequence of slowed-down production on pollution and the improvement of air quality which results from it (NASA Earth Observatory, 2020). It will also benefit the living areas of communities located close to production plants.

As already mentioned, the adoption of circularity will positively impact people by reducing unemployment. Indeed, as the circular model improves resource productivity, it also improves social productivity, resulting in an increase of both quantity and quality of work (Herrero Rodriguez, 2017).

Finally, an industry-wide application of the model would help to spread value throughout the whole supply chain, enabling all companies to provide their workers with good working conditions and decent pay.

4.4 Barriers to the Adoption of the Circular Model

Cultural Barriers

The culture of the company is usually the most common barrier to the adoption of circularity. In fact, company culture can sometimes hinder the shift to a circular model simply because the managers' main focus is not on sustainability and that the company does not prone these values in its mission and vision. This issue is therefore usually considered last and does not get the attention it deserves (Herrero Rodriguez, 2017; Kirchher et al., 2018). The lack of awareness from customers constitutes another reason why businesses do not make the leap: they are afraid their customers will not understand it or like it (Kirchher et al., 2018).

Cost Barriers

Initial costs related to research as well as the costs of modifying the business model, and then the supply chain as a whole, represent considerable amounts that some companies can simply not afford to spend (Herrero Rodriguez, 2017). Additionally, administrative costs linked to environmental legislation also constitutes large costs which further increase the burden of the shift. Finally, the lack of knowledge about the financial benefits that a circular model can bring to a company is one of the main reasons why businesses do not implement it. Many believe that the cost-benefit result is simply not worth it (Ritzen & Sandström, 2017), mainly because they focus on the short-term rather than the long-term vision.

Lack of Support

Governments are barely providing any type of support for businesses who want to adopt circularity: no tax incentives, no funding, no special rights on imports. This situation is pretty discouraging for a company. Moreover, obstructing laws regarding trade of material components constitute additional barriers from the governments (Ellen MacArthur Foundation, 2017; Kirccher et al., 2018). It is essential that governments and trade unions and bodies review some regulations and definitions of terms such as “waste” and “recycled material”, in order to encourage the shift to circularity. Adding to this the lack of support from the supply network, and especially from suppliers who do not want to comply to environmental or fair-trade regulations due to associated costs and complexity (Herrero Rodriguez, 2017), companies’ motivation drops significantly.

Lack of Technology

Some methods needed to implement circularity in the fashion industry require technologies that do not exist, or that are not yet available or affordable to everyone (Kirccher et al., 2018). It is therefore essential to unlock funds for research and development in this area to develop the appropriate technologies and techniques that will enable the model to come to life.

Lack of Knowledge and Skills

To adopt a circular model, the right people need to take part in the project. Too often, employees lack the knowledge of sustainability or the technical skills needed to innovate the products and the production processes (Ellen MacArthur Foundation, 2017; Ritzen & Sandström, 2017). It is essential to look for the right talents to ensure that such a project generates a successful outcome.

The Supply Chain Display

Implementing a new model throughout a whole supply chain requires coordination, communication and time. Yet, due to the geographic spread and the size of some value chains in fashion, these requirements become far more complex to fulfill. For large retailers, coordination and communication with suppliers is extremely difficult when considering the large pool they have at hand. Additionally, with such a widespread supply chain, accountability can be hard to define (Ritzen & Sandström, 2017). Indeed, in a company, who should be responsible for the implementation of circularity in the supply chain? Thorough governance should be established in order to make sure accountability is clearly defined throughout the company.

In conclusion, implementing circular economy in the fashion industry is complex and challenging. Yet, several companies have already built their businesses around circularity. The next section will analyze 4 companies which have successfully implemented this model, and then highlight best practices for reaching sustainability through circularity in fashion.

Part B: Empirical Part: The Circular Economy Model in Practice

This section of the thesis will describe the empirical part of the study. The methodology will be explained, followed by the case studies which will be described and analyzed. Finally, the results of the analysis will be provided.

Chapter 1: Methodology

This section will discuss the methods used throughout the research, in a chronological order.

To begin with, a literature review was conducted with the goal of establishing the context of the research. This theoretical section discusses the current linear model and its application to the fashion industry, the rising need for a more sustainable way of living and its origins, alternative business models in the fashion industry and, finally, the circular model, its benefits to society and the barriers to implement it.

Theoretical models of circular economy applied in the fashion industry were found in the literature. Yet, the answer of the means to achieve sustainability through circularity were not clearly explained in the resources consulted. There lacked in the literature a list of tangible initiatives that companies can implement in order to become circular. Therefore, the following research question was established: “How can the circular economy model lead to a more sustainable fashion supply chain?”.

The assumption was, of course, that by the very nature of the model, the implementation of circularity to the fashion industry would lead to a more sustainable supply chain. Indeed, in a circular model:

- Raw material sourcing is decreased, replaced by the re-use of materials, and fostered by a rising awareness of overconsumption.
- Design and production impacts are reduced by a more cautious choice of factories where operations are conducted responsibly and where human rights are respected, working conditions good and wages enough for people to live and take care of their families. Moreover, the design is thought for the clothes to last, and to be recycled easily when the time comes.
- Shipping and logistics have a small impact on the environment through the use of green energy or carbon-compensated means of transport. Additionally, overall distances are reduced through the use of local suppliers.
- Packaging is avoided when possible, and done only when necessary using recycled, reusable or compostable materials.

In order to identify tangible initiatives to answer the research question, an exploratory research by means of case studies and interviews was conducted. The choice of this approach enabled to gather insights from real-life cases and to create a non-exhaustive list of initiatives which subscribe to the circular economy model.

To gather some data, interviews were conducted by way of a questionnaire, broken-down according to the steps of the fashion supply chain: raw material sourcing, design, production, packaging, and shipping.
The questions were mainly built as open-ended to gather high-quality insights from the company founders and to avoid any restrictions in the answers collected. The only closed-questions concerned the certification of their processes, which could be answered on a "Yes or No" basis, but on which the interviewees usually elaborated as well. The questionnaire can be found in Appendix B.

The identification of potential interview candidates was performed through research on the internet, particularly through press releases on circular economy in fashion, and through the platform Yuman, the website of a new initiative gathering circular and sustainable products and services in one spot in Brussels (Yuman Website, n.d.).
There were two main criterium for the candidates to fulfil:

1. To be active in the circular economy in the fashion industry.
2. To be based in Belgium or in France to ease the communication and to potentially have the possibility to visit the company/production plant/design office/…

Finally, among the list of companies contacted, four replied positively, of which two agreed to an interview. The interviews were conducted via videoconference, during which the preliminarily shared questionnaire was answered by the interviewee. Transcriptions can be found in Appendices C and D.
The two other companies shared resources that allowed to answer the questions without conducting an interview, such as podcasts, blogs and videos.

Based on the information gathered from the interviews and the other sources shared by the people reached, a study of the four companies was built, investigating each of the businesses' supply chains, on-going projects, future outlooks and impacts on the environment and society. Then, a short business model analysis was performed.

This analysis and the literature review previously conducted then support a series of best practices for creating a circular business in the fashion industry.

Chapter 2: Case Studies

This section of the thesis will investigate the business models of four companies which have integrated circularity in their fashion companies; respectively My Einfühlung, Isatiò, Hopaal and Loom. For each brand, a short introduction will be presented, along with the company's philosophy. Next the supply chain will be described, as well as the brand's on-going projects and future outlook on the company. Then, benefits to the environment and society will be described. Lastly, an analysis of each company's business model will be provided.

2.1 My Einfühlung[4]

The Company's Story

My Einfühlung was founded by Flavia Carbonetti in July 2017, and was officially established in Luxembourg in October of the same year. Mrs. Carbonetti launched her own project as a Limited Liability Company (LLC), after having studied fashion and working as a freelancer in Florence. The LLC status enabled Mrs. Carbonetti to create her own company rather easily, by allowing her to avoid large initial expenses and to create her business online.

Mrs. Carbonetti created her company after working 5 years in the industry. During that time, she realized how polluting and wasteful the industry really was. As she explains: "Fashion is my passion, but not done like this!". This realization is what triggered her into creating her own, sustainable company. Moreover, she realized the demand was growing for such products, therefore it was the perfect timing to launch her project.

"I want to create fashion in a more conscious way"—Flavia Carbonetti, January 9, 2020

My Einfühlung produces only unisex clothes for different reasons:

- It corresponds to the founder's style. She has worked in both male and female fashion so she likes both and she also wears both. Of course, there are some pieces specific to gender, such as a cocktail dress for women or a suit for men, but according to Mrs. Carbonetti, there lacks something in the middle: something easy-going, that can be worn by everyone.
- It allows her to produce only one collection per season, which decreases the amount of waste created and energy used.

[4] This case study is based on the interview conducted with Flavia Carbonetti (Appendix C), the official website of her brand My Einfühlung, and internal communication.

— She likes the idea of sharing clothes, of exchanging them with friends or partners.
— It fosters creativity as clothes need to fit to for both genders, and the look of one piece of clothing on a man can be completely different if worn by a woman.

The goal of the company is "to create contemporary unisex pieces that can be shared between men and women", while establishing a "good balance between what has been and what might be, craftmanship and new technology". Mrs. Carbonetti's mission is to be sustainable by producing clothes in the most ethical way possible, with the least resources possible. She wants to be able to produce more outputs than inputs.

My Einfühlung is for now solely composed of Flavia Carbonetti, the founder, who partners with third parties and free-lancers. Last year, she sold 25 pieces of clothing, and had a revenue of €20,000.

The Company's Supply Chain

Born and raised in Italy, it was not too difficult for the founder to find eco-responsible and sustainable fabric suppliers over there. Moreover, after some thorough research and documentation on the subject, as well as visits to textile fairs, several suppliers were identified. New solutions are developed every six months, so according to Mrs. Carbonetti it is essential to visit such fairs every season. She sources her fabrics mainly in Europe, to ease the traceability of products. Traceability is an important feature for the company, so Flavia Carbonetti always tries to get to the original source of the fabric. Yet, it is not easy to achieve and this is why European textiles are preferred.

The fabrics used to produce the clothes include cotton, cellulose, linen, wool, hemp, bamboo, tencel and 100% recycled polyester. A strong preference for linen and wool is reflected throughout her collection. The reason for this is that both types of fabrics can be grown in Europe and are easily traceable. Additionally, the wool is sometimes issued from recycling processes, when sourced via Cardato Recycled which ensures the fabrics are composed of 65% of recycled materials. Furthermore, a certification for linen called "Master of linen[5]" exists, which the linen sourced by My Einfühlung has obtained. Concerning wool, it is the only fabric that can be recycled even if it is not 100% mono-fiber, which is a considerable advantage. Bamboo and Tencel are grown in Asia, but the fabric suppliers have some certifications. In the future, Flavia Carbonetti plans on recycling her own fabric scraps, when her production will be big enough to allow it.

[5] Masters of Linen® is a certification which takes into account social and environmental responsibility, European origin for everything from the plant to the thread to the textile, European know-how and employment, proximity, low carbon emissions, excellence and innovation (Masters of Linen Official Website).

The trimmings and buttons come from Berbrand, a leader in sustainable fashion which constantly innovates to provide green products such as buttons made of Corozo nut, recycled paper or pressed recycled cotton. The zippers are sourced from YKK, a Japanese company with a strong sustainable commitment. Yet, as zippers are less eco-friendly than buttons and come from further away, they are used only for pants.

Flavia Carbonetti maintains that it is essential to think critically when creating a sustainable brand.

"You should not only think about certifications, but also understand that things can be sustainable without them."—Flavia Carbonetti, January 9, 2020

The design of garments is created solely by Mrs. Carbonetti herself, in Luxembourg.

Once designed, the canvases are sent to Italy, where the clothes are produced by two different companies close to Bologna, both benefitting from certifications from the Italian Chamber of Commerce. The first collection, the one to present to potential buyers, is produced by one company, which creates a 3D prototype and then a real one, to avoid waste. Once the model is created and satisfies Flavia Carbonetti, the big production is done by a neighbor company which has bigger capacity.

The factories use technologies such as laser-cut machines and programming which enable to reduce fabric waste. Yet, some cuts still need to be done by hand. Knitwear pieces are created by two craftswomen in Italy.

The clothes are currently packaged using paper bags and silk paper, which are then stamped with the brand's logo. There is a project to work with Repack, a Swedish company which creates reusable envelopes that the customer must send back in exchange for some discounts on the next purchase. Unfortunately, due to the small volume of online sales which is currently witnessed, it is not feasible to partner with such a company.

"It can be difficult to partner with larger companies when you are a small SME."—Flavia Carbonetti, March 17, 2020

The logistic operations are handled mainly through T-express (TNT), both for the shipping of fabrics to the production factory, and then from the factory to Luxembourg. Fabrics and buttons come from the same region in Italy, so there is only one shipping. Moreover, the clothes are shipped to Luxembourg only twice per fashion season: once for the prototype and once for the collection to be sold. Currently, the brand does not benefit from its own brick-and-mortar shop, but has an e-commerce and sells in three shops in

Luxembourg. Customers who order via the website are delivered through the carbon-neutral options from DHL or TNT.

On-going Projects

The company is currently investigating 3D prototyping. This technique has several very interesting benefits:

- It allows to save time.
- It allows to save money through less use of fabrics.
- It reduces waste as only the final design is created with fabrics. The rest is just trial and error on a computer.
- It allows to speed up communication with Italy, as it would mean that prototypes can be sent through e-mail, instead of having to ship a real-life piece of clothing.
- It reduces CO2 emissions, for the reason mentionned right above.

Furthermore, the brand is researching the possibility of virtually presenting collections for business-to-business (B2B) purposes, by means of virtual reality. This technology would enable the company to present the brand in a digital way, and to produce the full line of clothing only if a buyer is interested in buying and selling it. This is especially interesting for pieces that exist in several colors. This technique would greatly reduce the amount of waste which results when a piece of clothing is created, presented, but not bought. Yet, implementing this technology constitutes risks, as usually buyers want to see the clothes in real life to have a grasp of the fabric.

"With the current Covid-19 crisis, this alternative [virtual presentation] is very interesting as all fashion-related events have been canceled and I cannot present my new collection."—Flavia Carbonetti, March 17, 2020

Finally, a new feature of the website was released recently, with the possibility to rent clothes. To achieve this, Mrs. Carbonetti keeps some pieces of clothes from her stock, to enable people who like to change their wardrobe frequently to do so without having to buy new clothes. The founder would like her creations to circulate from owner to owner. This would also create word of mouth and some advertisement for the brand.

Future Outlook

If the company grows, some adjustments might have to be made to the supply chain. Yet, Mrs. Carbonetti's idea is to "grow sustainably". If she has to hire somebody to help her for the design, criterium will be elaborated to ensure the sustainability commitment is respected.

The goal is to maintain the production in Italy. Yet, if it becomes necessary, she is thinking of relocating her production in Spain or Portugal, but only for knitwear. And of course, the factories she would be working with would have to be certified. Nevertheless, for marketing purposes, it would not be optimal to relocate some parts of her production, neither would it be to switch to mass production. Flavia Carbonetti believes it would make her clothes less desirable.

"It wouldn't make sense to relocate somewhere else, and I would prefer to keep it 100% made in Italy."— Flavia Carbonetti, March 17, 2020

Environmental Impact

Sourcing materials in this way results in less pollution from agricultural activities, as natural fibers are grown respectfully of the environment, using fewer pesticides and other fertilizers. Moreover, as fabrics are sourced mainly in Europe, the garments produced in Italy, and then sold in Luxembourg, transportation and associated CO2 emissions are greatly reduced. As shipping to customers is done through carbon-neutral[6] alternatives, business-to-customer (B2C) transportation does not impact the planet much.

Clearly, there is a focus on reducing waste in the brand's supply chain. The thorough production and the optimization of fabric use, as well as the use of laser-cut machines and the idea of 3D prototyping and VR collections: all these techniques enable the company to reduce its waste production compared to other fashion businesses.
Finally, the use of natural fibers and paper packaging does not produce any plastic-related waste.

Social Impact

Workers who are linked to My Einfühlung's supply chain all benefit from good working conditions and decent pay: both the people sourcing the fabrics, and the ones producing the clothes, as the Italian Chamber of Commerce certifies it.

[6] Carbon-neutral shipping relates to practices which result in a net-zero amount of GHG emissions. This usually means that the shipping company compensates its emissions by removing as much as it emitted through another way.

2.2 Isatiò[7]

The Company's Story

Isa Tiò founded the brand of the same name in 2008. After having studied fashion design at Saint-Luc, she has worked in the Belgian fashion industry, witnessing the amount of fabric that was wasted every season. The company she was working for went bankrupt, and this is when she decided to launch her own project. She contacted a textile company to ask for any fabric scraps and tested some designs. Her work was a success and the pieces sold very quickly. She therefore decided to create her brand and dedicate herself to this project. During nine years, Isa Tiò has worked alone, her husband Jordi helping her with the administrative and economic aspects of the business. Three years ago, Jordi Tiò decided to join her full time. Since then, he has been working on streamlining some processes and restructuring the business.

The company is based on an upcycling model, where the materials used consist strictly of waste from the textile industry. The project also adopts a short supply chain approach, as all steps of the value chain are performed within an 80 km radius of the studio.

The use of good quality fabrics and modern designs result in garments which are durable, timeless pieces, the opposite of fast fashion clothes.

Isatiò is for now constituted of solely Isa and Jordi Tiò.

The Company's Supply Chain

Isatiò sources its materials in Belgium, from the scraps of fabrics of the textile industry. As they put it, their goal is to "give back value to materials which do not have some anymore". From Mrs. Tiò's previous work in the Belgian fashion industry, they have built a network of contacts with whom they partner to get remaining pieces of fabric. The brand does not benefit from any type of certification concerning fabrics used or production processes. Indeed, it is quite difficult to get materials from upcycling certified when they were not initially.

Once the fabrics have been collected, the design process begins. With such a wide array of materials, and in different quantities, creativity is essential in order to imagine the end result. Mrs. Tiò sorts the fabrics by color and material, before brainstorming potential designs. She does this process by herself.

[7] This case study is based on the interview conducted with Jordi Tiò (Appendix D), the official website of the brand Isa Tiò and internal communication.

Once the clothes are designed, they are produced by different groups of people. The brand works with "Entreprises de Travail Adapté" (ETAs); social organizations that offer jobs to disabled people, as well as with school drop outs, people from rehabilitation centers, independent sewers, and even students from design schools. This production model adds some extra complexity as the team is not fixed and therefore quality of clothing is not either.

"The team is frequently changing so it can be difficult always to keep the same quality of garments."—Jordi Tiò, March 30, 2020

They try to avoid any packaging, but when asked for it, they use exclusively paper bags and silk paper.

The logistics part of the supply chain is handled in a very eco-friendly way, with barely any environmental footprint resulting from it. Indeed, fabrics are delivered from suppliers to the studio using HushRush, a delivery-by-bicycle service company which operates in all 19 districts of Brussels. Once the clothes have been created, they are either sold privately through sales organized in the studio, at fairs and designer sales where Mr. and Mrs. Tiò take the clothes with them, or in shops where the delivery is done either by Bpost or by the owners through public transportation. To transport the clothes, they use IKEA bags that can be reused indefinitely.

On-going Projects

The brand does not benefit from any certification right now, yet they were approached by university students working on developing a durability index, which would include measures of the environmental and social impacts, as well as the origin of the fabric.

The company is currently developing the Furoshiki technique, a Japanese packaging technique which consists of wrapping using cloth, therefore making it a reusable package. The cloth can also be used for other purposes afterwards. They are currently selling those packages as well, and are planning on organizing workshops to teach the technique to others.

Finally, Jordi Tiò is currently investigating the exact CO2 savings that are made through their garments production. The project has already been completed for their newly designed jackets, 100% made from paragliding fabric, which saves 6.2 kg of CO2 per item.

Future Outlook

For the company, growing is not an issue. Indeed, there is plenty of waste still available in the Belgian textile industry to exploit. Right now, the issue is more on the demand side: their products are currently serving a niche market. Moreover, as Mr. Tiò explains, the demand is rather uncertain and volatile, making it difficult to plan for future growth.

Environmental Impact

There are two major environmental benefits of this company's supply chain: no use of raw materials and barely any pollution.

Through the application of upcycling, the brand is only sourcing fabrics that would otherwise go to waste, therefore avoiding to drain the planet from its resources, and avoiding pollution related to landfills or to bleaching and dyeing processes.

Furthermore, through their short supply chain and use of bicycles and public transportation for logistics, an extremely small amount of CO2 is released by their operations. Additionally, their studio is supplied with partially green energy and a closed-loop water circuit, further reducing their energy consumption and in fine, their environmental footprint.

"Our workshop is in our house. […] We are investing and making efforts to decrease our footprint as much as possible."—Jordi Tiò, March 30, 2020

Social Impact

The company has a strong social commitment, which is also one of proximity: helping people of their own community, in Brussels, is one of their main engagements. Through their employment policy, the brand has helped people in various ways: from giving access to a decent job for people who usually do not benefit from it, to training people, to giving guidance. Additionally, Mrs. Tiò gives sewing and design workshops. She also organizes events for people to learn how to repair their clothes: those from her brands but also others, supporting an idea of durability.

2.3 Hopaal[8]

The Company's Story

Hopaal was founded in 2016 by Clément Maulavé and Mathieu Couacault. To launch their brand, they created a funding campaign on KissKissBankBank, a crowdfunding website, on which they were pre-selling recycled t-shirts in order to get the money before producing the products. Mr. Couacault was still studying in France, and Mr. Maulavé was doing an internship in India, which made the launch rather difficult to manage. Nevertheless, this situation turned out to the best, as Mathieu Couacault dealt with all the administrative work while Clément Maulavé found small factories in India to produce their t-shirts. Being there made it easier to find suppliers that were offering good working conditions to their workers. Eventually, the campaign was a huge success, as they managed to sell around 700 t-shirts. This was the beginning of Hopaal.

The brand is constantly evolving to integrate new knowledge in the process. For example, Hopaal quickly stopped producing in India because, even though the workers benefitted from good working conditions, the emissions related to transportation were too high. Yet, they have maintained their pre-order system for several reasons:

- It has an economic advantage as it enables the company to receive money before producing the garment. This helps them to pay for the materials and the producers in advance, and also releases them from the risk of not being paid.
- It has an environmental advantage, as they produce only what is being consumed, avoiding stock.
- It forces the buyers to think about their purchase, as during the waiting time they can withdraw their order at any time.

"Pre-ordering is a magical concept!"—Clément Maulavé, February 2, 2020

Nevertheless, they produce in advance for cheap, frequent items such as socks or hats.

The brand was created as a means to have an environmental impact. Their mission is to respond to a need: they want their products to be purchased only when the customer really needs them.

8 This case study is based on a podcast of Clément Maulavé and the official website of the brand Hopaal. All resources can be found in the bibliography.

"We got inspired by Patagonia and Veja to build our brand and its vision."—Clément Maulavé, February 2, 2020

In 2017, Hopaal had revenues of €150,000, which doubled to €300,000 in 2018. The company is composed of 6 full-time employees, including the 2 co-founders, a designer and a communication manager.

The Company's Supply Chain

The brand creates new products by asking their community what they need. On their website, there are generally one survey to be filled in. According to those, Hopaal decides what to create next.

"We want to respond to a need. We want to create things that are useful and which people need."—Clément Maulavé, February 2, 2020

The brand uses mostly recycled materials such as:

- Recycled cotton from France, issued from fabric scraps which normally end up as waste.
- Recycled clothes from France and Spain, which are gathered through collecting bins, sorted to identify good quality fabrics, and then recycled.
- Recycled polyester from Spain, France and Europe, created with recycled plastic bottles.
- Recycled polyamide issued from production scraps from several workshops and factories along the supply chain.
- Recycled Merinos wool from Poland, coming from leftovers from the spinning production.
- Recycled polyester certified SEAQUAL, a Spanish company which transforms plastic bottles and fishing nets gathered from the oceans into recycled polyester threads. The label certifies that the product has been created with upcycled marine plastic.
- Recycled polyamide certified ECONYL, an Italian company which transforms nylon waste from landfills and oceans, such as fishing nets, into regenerated nylon.
- Modal: a natural, synthetic fiber composed of cellulose, the main compound of cotton. The cellulose used to create the fabric comes from Austrian wood chips.
- Recycled hemp and cork, mainly for details and buttons.

When using recycled fabrics, the company promotes the use of homogeneous threads, to ease the recycling process at the end-of-life of their products.

Hopaal also uses organic cotton to strengthen the recycled fabric, as the recycling processes are not perfect yet and can weaken the fiber. Finally, the brand makes use of virgin fabrics, when no other alternatives are available. This constituted in 2019, only 0.8% of their material consumption.

Upcycled fabrics are used to create prototypes, for accessories such as caps, or for DIY workshops which they organize in their shop in Biarritz.

There are some limits when creating clothes from recycled fabrics. It is the stylist's role to imagine garments with a nice aesthetic within the constraints. For example, mottled fabrics usually result from the recycling process. Blandine Remy, Hopaal's designer, has to figure out how to enhance that textile's look.

Once a prototype is built, it is tested, either by wearing it in everyday life, or, for products with high forecasted sales, in a laboratory.

The garments are produced primarily in France. Sometimes, clothes are manufactured in Portugal or Spain, but always less than 1000 km away from their office in Biarritz, to limit the transport distances. By emphasizing short circuits, Hopaal aims at contributing to the local economy. The company partners with suppliers who share the same values as the brand: transparency, responsibility and sustainability. The brand makes sure that every stakeholder it partners with limits waste and ensures good working conditions. For them, a key asset is to create long-term relationships with each single one of their suppliers, to ensure a solid, long-lasting supply chain.

According to Hopaal's vision, it is essential to minimize packaging as whatever material is used, it is usually a single-use package which ends up in the bin very quickly. Therefore, the company has banned polybags[9] from its supply chain, replacing them by a thin cellophane paper inside the cardboard boxes. To ship orders to the customer, the brand started by using recycled plastic envelopes. Then, they switched to cardboard boxes in order to avoid the single-use of plastic. The advantage of this solution was the different size options which enabled the brand to optimize shipping by always making sure the size of the package matched what it contained. Yet, this solution was still single-use. Now, the company is integrating Repack in its shipping process. Repack is a Finnish company creating solid envelopes which the customer sends back after receiving his package. The envelopes are sent to Estonia to be cleaned and then sent back to Hopaal offices. An analysis has shown that already after the second use, a Repack envelope is less impactful than a

[9] Polybags are very thin plastic bags used to individually pack and protect pieces of clothes during transport.

cardboard box. Moreover, the advantage of Repack envelopes is that they are adjustable, therefore helping to optimize shipping spaces in trucks.

"We have a very radical view on packaging."—Clément Maulavé, February 2, 2020

To limit the environmental impacts due to transportation, production centers have to be as close as possible to the consumption centers. This is why Hopaal has implemented their 1000 km policy, mentioned above. Additionally, it is essential to optimize shipping volumes to avoid unnecessary travels. Transportation is achieved by road, with trucks.

On-going Projects

Being based in Biarritz, the Hopaal team is very concerned about ocean pollution. This is why the brand is developing a project which aims at giving back value to fishing nets found in the ocean.

According to the brand, supporting traditional sectors is necessary as this is how production should be achieved in the future. Therefore, the company is investigating the use of linen, as France is its prime supplier worldwide. The promotion of short supply chains being critical for Hopaal, they believe it is essential to research this topic.

Lastly, even though the company is being cautious about the waste it produces, fabric scraps are inevitable. To avoid throwing them away, Hopaal is working on the creation of a bum bag made from upcycling leftover fabric.

Future Outlook

The team lets itself be carried by the opportunities that arise. For example, they have recently opened a brick-and-mortar shop, which happened last-minute through an offer they received. The founders do not know what the future is made of, but what they do know for sure is that they want to stay relevant, and evolve with the new knowledge and innovations that emerge. They want their mission to grow to increase the positive impact they have on the planet and the people. The team is constantly thinking of new projects: acquisition of certifications, CSR audits, creating a collection system or offering a repair service: possibilities are endless. As they put it: "Solutions are as diverse as the issues to solve".

Environmental Impact

The company is transforming waste through their use of recycled materials and upcycling. It is also reducing waste by raising the awareness of their customers about responsible consumption.

The company has partnered with "1% for the Planet", therefore committing to give 1% of their revenues to different associations working to protect the environment.

The brand has banned all dangerous chemicals from its garments: chemicals linked to the dyeing process, the printing process and the waterproofing process which can endanger health or the planet are excluded. Most of the garments produced by the brand are not dyed as recycled fabrics already have pigments, but when a dye is necessary, it is always certified with the Oeko-Tex Standard 100[10].

All garments produced by the brand have the Reach certification[11].

Hopaal also respects animal lives and therefore has banned all animal-related virgin fabrics. The only fiber from animal origin is the recycled wool, which is used because it is not a product of animal exploitation.

By choosing carefully their suppliers and building a strong relationship with them, Hopaal ensures that waste consumption, water pollution, pesticides, energy, land and chemicals use, as well as microfibers and transportation are reduced, while human and animal well-being, warranties, recycling and composting are emphasized.

Social impact

The main impact Hopaal has is on and through its community. Indeed, through the high-level of engagement it has created and the awareness it raises every day via newsletters and constant updates on their website, the brand is building a community which believes in and carries the values supported by Hopaal. The company wants to educate its customers on the impacts of the fashion industry, and provides insights on

[10] If a textile article carries the STANDARD 100 label, you can be certain that every component of this article, i.e. every thread, button and other accessories, has been tested for harmful substances and that the article therefore is harmless in human ecological terms (Oeko-Tex Website).

[11] A regulation of the European Union, adopted to improve the protection of human health and the environment from the risks that can be posed by chemicals, while enhancing the competitiveness of the EU chemicals industry (ECHA).

sustainability in everyday life. For example, the brand is committed to raise awareness about the importance of carefully washing clothes, and how cautious care and maintenance result in durability.

Moreover, through their supply chain, Hopaal has a positive impact on the people producing their clothes, who benefit from good working conditions and a decent salary. The company also works with rehabilitation centers, and in this sense provides employment and hope to secluded people.

Hopaal's supply chain is radically different from fast fashion processes. In Appendix E, a figure depicts a comparison between the two models.

The founders believe that decisions being taken by governments are too remote. Through their actions and the ones of similar ethical companies, the brand hopes to trigger something that will speed up change. Yet, this change has to come from everyone: large fast fashion companies must change as they are the biggest producers and have the biggest market share, but this process will be incredibly slow. Small brands on the other hand, can change quickly but will have a small impact.

2.4 Loom[12]

This last case study is quite different from the others as Loom's business does not follow a circular economy model per se, but rather embraces durability as its mission, with the goal of raising awareness of overproduction and consumption, and reducing it by producing clothes that last.

The Company's Story

Loom's story started in a rather unconventional way, as editors of the newsletter "Merci Alfred", a weekly publication which investigates controversy topics and publishes lifestyle articles, realized they did not know where to buy good quality shirts. They therefore decided to create their "perfect shirt", with 100% good quality materials. The garment was a success, and the 1000 pieces sold in 24 hours.

This event triggered the launch of their brand, Loom. When visiting factories, the team realized that workers did not know what was quality anymore, because that is not what they were asked to produce; they were

[12] This case study is based on a podcast of Julia Faure, the official website of the brand Loom and its blog, and internal communication. All resources can be found in the bibliography.

asked for low prices and innovation, in accordance with the fast fashion model which renews its collections every month. One of the main consequences of low quality is, of course, overproduction and consumption, which Loom is fighting against through its high-quality products and a sole collection produced and renewed every year.

When Merci Alfred got acquired by a large media company, Guillaume Declair, part of the team, decided to dedicate 100% of his time to Loom and hired Julia Faure to carry the project with him.

Realizing rather quickly that the brand needed funding, the team decided to raise money through a public collect of funds. This decision was based on the idea that being backed up by business angels or investors would force them to prioritize growth and sales over what really mattered to them: high-quality and sustainability. Therefore, in order to make sure that their investors were carrying their values, they wrote an article to raise some money. Around 600 people donated for the cause, which enabled them to raise €700,000 in just four days. Some of them were customers, others were not familiar with the brand, but all believed in the project. This financial support helped Loom to recover some cash-flow and to handle orders, stocks and inventory more easily. According to Julia Faure "No ethical fashion without ethical funding".

"It is impossible to transform Zara and H&M into sustainable brands, because they are not backed up by humans but by investment funds, which only look at revenues and do not care about footprint."—Julia Faure, November 5, 2019

Loom employs four people, sold 26,000 pieces of clothing last year, and had a yearly revenue of around €850,000 in 2019.

The Company's Supply Chain

The choice of raw material is an extremely important step for Loom as it determines the quality of the garments. To find top-quality fibers, they attend fairs such as Première Vision in Paris, where suppliers present their products, their last innovations and trends for the season. More and more engaged fashion stakeholders attend this event to provide sustainable alternatives to the garment industry. Loom also interacts with luxury brands, as these usually use high-quality fabrics.

The wool they use is from Patagonia and certified GOTS (Global Organic Textile Standards), which ensures good working conditions, decent salaries, and at least 70% of biological fibers and a very strict use of chemicals. Fabrics to create pants are sourced from Velcorex, a French factory creating high-quality fibers

while being worry of the environment and continuously integrating innovation in their processes. Recently, they have been willing to switch to biological cotton for 100% of the cotton products. Yet, it is difficult to find high-quality biological cotton due to the uncertainty of outputs. Julia Faure outlines that the origin of the fabric is not the origin of the fiber or the thread, and that it can be very difficult to find the exact origin of a fabric.

"Tracing the exact origin of the fiber is impossible if it is not certified."—Julia Faure, November 5, 2019

As Loom's main focus is quality, their design process is a little atypical. When creating a new piece of clothing, they first send out a questionnaire to learn more about the reasons for throwing away that type of garment. Then, they try to solve the most frequent problems i.e. color fading, lint formation, deformations, by researching the reasons for them, which usually include the nature of the raw materials used and their quality. Next, several prototypes are created and tested in a laboratory. In total, it takes around six months to create a new garment. Yet, it is finding the right textile which takes the longest. Once the fabric is chosen, the rest can be achieved rather quickly.

All their garments are produced in Portugal, because working conditions there are good, and it is quite close to France so easy to travel to. To choose which factories to work with, the team flew down to Portugal and visited several ones. According to them, having a good contact with suppliers is essential to ensure that values are understood and shared. As they prioritize quality, usually the manufacture is more expensive, and delays can happen, which has resulted in several delivery issues. Yet, this is a trade-off that the company easily accepts.

Once the clothes are manufactured, they are shipped by truck to Troyes, where Loom's logistic center stands. From there, the clothes are sent to the customers, also by road.

The company is still using polybags to protect its clothes, as it believes it is the best alternative to protect the garments, even though it is not eco-friendly. Once the clothes arrive to the distribution center, they are packed in Kraft envelopes and sent to the customer.

Loom does not spend on marketing techniques, because the team believes that advertising pushes people to buy things they do not need. This is a similar technique to the one used by Veja, a sustainable sneaker brand. The brand does not engage in any promotions or sales for several reasons:

— They do not need to eliminate stock as their collection remains the same year after year.
— Creating promotion is costly for the company, and Loom cannot afford it. Indeed, offering high-quality garments at an affordable price already leaves them with a small margin.
— Reducing their prices means that someone else in the supply chain will have to pay for it: either the people working for Loom, the planet, or eventually the customers who end up with low-quality garments.
— Promotions is a way to foster sales, which is against Loom's core value of buying less but better, and when you need to.

On-going Projects

Loom is currently developing its women collection. Right now, the e-shop only offers clothing for men. They have decided to create a female collection due to the demand they have for it, and because finding affordable, sustainable high-quality clothing for women is not easy either.

Future Outlook

For Loom, growth is not a valid criteria. Therefore, they are not focusing on increasing their client base or their sales. For them, the crucial thing is to establish solid foundations for their brand, and to create sustainable, high-quality garments. Of course, they are growing, but according to them, this is not and should not be a sustainable brand's main goal.

"Growing is not an objective, it's a wrong objective."—Julia Faure, November 5, 2019

Environmental Impact

With a focus on organic fabrics, Loom is contributing to reducing the pollution of agricultural lands.

The factories which produce their clothes respect the European Union (EU) laws and therefore treat waste waters according to EU regulations. Moreover, the choice of Portugal allows the clothes to be shipped over relatively small distances, therefore reducing CO2 emissions.

Finally and most importantly, Loom's goal is to have an overall impact on overconsumption, by providing the highest quality of clothes which last for a long period of time and therefore decrease the need for frequent purchases. Their garments are also very unlikely to end up in landfills, as their laboratory tests ensure there should be no reason to throw them away.

"Overproduction and overconsumption are the root causes of the environmental crisis."—Julia Faure, November 5, 2019

Social Impact

By working exclusively with European factories, Loom ensures to its workers decent working conditions and pay. Additionally, through its blog "La mode à l'envers", the brand aims at educating its customers, and raising general awareness of the environmental and social impacts generated by the fashion industry.

2.5 Business Model analysis

This section of the thesis will analyze the 4 companies based on their business model, using the Ellen MacArthur Foundation's framework discussed in the literature review on page 26. This graph describes three main principles to achieve circularity:

1. Preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows.
2. Optimize resource yields by circulating products, components and materials in use at the highest utility at all times, in technical (and biological) cycles.
3. Foster system effectiveness by revealing and designing out negative externalities

As in the fashion industry, technical cycles are more frequent than biological ones, an exclusive focus on the right part of the graph will be given in the analysis of the case studies.

Analysis of My Einfühlung's Business Model

The brand is controlling its use of finite resources by minimizing wastes at all steps. It is also using substitute materials such as tencel to avoid polluting and unsustainable fabrics. Moreover, with her idea of a virtual collection, the founder is furthermore preserving the environment.

My Einfühlung is optimizing resource yields by using recycled fabrics. Additionally, the collections being unisex, it can be worn by both men and women, this way the clothes can be shared even more easily. Moreover, with the launch of its renting platform, My Einfühlung can redistribute the clothes to anyone who wants to wear them for a short period of time. The clothes are composed of high-quality materials and made to last, therefore their lifespans are usually longer than fast-fashion clothes.

Finally, the brand is designing out externalities by using materials which are respectful of the environment and society, designing and producing in a conscious way, and using carbon-neutral transportation means for B2C shipping. Social externalities are also reduced as the company only partners with Italian factories offering good quality working standards.

Analysis of Isatiò's Business Model

Isatiò is implementing all three principles of MacArthur's graph very strongly.

Indeed, through its upcycling model, the brand is barley using any new raw material, mainly focusing on scraps of fabrics from the textile and fashion industries, therefore restoring old material with no value to high-value products.

The brand is optimizing resource yields by reusing old fabrics, but also by creating workshops where people can repair their clothes, therefore increasing the lifespan of their own products, as well as other clothes that people bring to the workshops.

Finally, through the investments made in the house where the clothes are produced, as well as through the very conscious transportation means used throughout the whole supply chain, Isatiò is thoroughly minimizing the externalities of its operations. The brand is also reducing social externalities by offering decent working conditions and wages to anyone contributing to the project.

Analysis of Hopaal's Business Model

As Hopaal is creating clothes from recycled fabrics, the brand is strongly active in the first dimension of MacArthur's graph, by preserving the natural capital and controlling its use of finite resources. Additionally, the brand uses scrap fabric for prototyping, therefore also implementing upcycling to some extent.

Moreover, as the brand focuses on creating products that people need, they are manufacturing very high-quality products, which therefore enables their owners to keep the clothes they buy longer. Furthermore, Hopaal favors the use of homogeneous threads, to ease the recycling process of their clothes down the line.

Finally, the brand has also minimized its externalities through its very cautious production processes (all dangerous chemicals are banned from their operations) and its partnership policies with factories in France, Portugal and Spain. Through its 1000 km policy, the brand is also reducing its CO2 emissions during transportation. Additionally, Hopaal is raising awareness on the maintenance of clothes, in order to avoid

waste (when throwing clothes out) or water pollution (when inappropriately washing them). The brand has also a strong commitment towards packaging, minimizing it as much as possible to reduce waste.

Analysis of Loom's Business Model

Contrary to the other brands, Loom's business model does not really fit the circular economy principles of the MacArthur Foundation. In fact, the brand uses mainly raw material to create its products. Loom does not provide any platform or incentive to share or repair its clothes, and does not focus its efforts on reducing externalities from its production or transport operations.

Nevertheless, the brand focuses on reducing overconsumption by offering very high-quality clothes made to last. Taking this characteristic into account, it can be deducted that Loom's business model does promote the preservation of natural capital, the optimization of resource yields and the minimization of externalities.

Indeed, by selling high-quality clothes the brand aims for people to buy fewer garments as they last longer, therefore reducing the amount of raw materials used. Secondly, as these garments are made to last, the resource yields should be optimized, as the clothes should be thrown away only when they become too used to be worn, which might actually never happen. Finally, the brand is promoting reduction of waste through these garments which should never be thrown out, therefore decreasing externalities.

Moreover, by partnering with factories in Europe, the brand also reduces potential negative social externalities.

Conclusion

As can be understood from the analysis, all four companies have implemented the three principles of circularity in their business model, in various ways and to different extents.

Principle 1: The brands are being cautious of their resources' usage, opting for substitutes such as Tencel, restored fabrics such as recycled cotton or virtual options when possible. All have a special focus on waste reduction.

Principle 2: Resources yields are optimized in different ways depending on the business: either by implementing a renting platform ("share"), holding repair workshops ("maintain"), upcycling ("remanufacture"), using recycled fabrics ("recycle"), or simply by ensuring the garments will stay in good condition a long time.

Principle 3: Externalities are designed out by opting for sustainable production processes, transportation means and packages.

Yet, there is one fundamental question which is not answered by any company: what happens when a customer wants to dispose of his clothes? Indeed, even though some of the brands have created designs which enable re-manufacture or recycling, none of the companies investigated have set up a recycling or upcycling process for their own products when they reach end-of-life. It would be essential for these businesses to implement such initiatives to fully close the loop.

Chapter 3: Results

The empirical part, supported by the literature review, enables to answer the research question: “How can the circular economy model lead to a more sustainable fashion supply chain?”. In this section, a summary of the different initiatives towards the integration of circularity in a fashion business, that were taken by the brands studied at each stage of the supply chain, will be provided.

3.1 Raw Material Sourcing

The four fashion brands favor the sourcing of quality materials, as these will create clothes that last longer. This essential choice is the basis for a sustainable brand, as it opposes completely the fast fashion idea of buying and throwing away constantly.

Within a circular business model, there are two main options in terms of sourcing:

- Choosing recycled materials
- Upcycling

Both have their advantages and disadvantages: recycled materials enable more freedom in design, but can be more expensive and the recycling process is still a rather polluting one. Upcycling on the other hand, does not produce any pollution, yet it is much more difficult to create clothing due to the diversity in colors and quantity of each fabric salvaged. Yet, both result in a reduction of waste.

When necessary, virgin materials are also sourced, but under certain conditions. The fibers have to be organically and ethically grown. Moreover, the working conditions of farmers growing the fibers must be positive, along with their wages.

3.2 Designing

The design step is especially important for the garments’ end of life stage. Indeed, in order to ease the recycling of the garment once it is not wearable anymore, a couple of guidelines have to be respected. Firstly, it is better to use fabrics composed 100% of the same fiber, as most textiles are not recyclable when their composition is mixed. Next, the design of the clothes in itself must be created so as to be easily disassembled at the end of life.

To discourage overconsumption, sustainable brands usually offer only one or two collections each year, contrary to the 24 collections of fast fashion brands. Unisex pieces further support sharing and optimizing the yield of clothes.

Finally, testing garments through a laboratory, or simply through a warm wash is recommended to ensure high quality and long-lasting clothing.

3.3 Producing

The production step is a relatively polluting one, which also has adverse outcomes on society, the workers in particular. In order to reduce the externalities that result from the production process, it is essential to choose factories that ensure good working conditions to their workers, decent working hours and, of course, a satisfying wage. European factories usually fulfill those conditions. Moreover, environmental rules are stricter in Europe. Therefore, companies from this region have more than one reason to get their designs produced locally, especially when considering the fact that transportation distances are smaller.

Additionally, it is important to partner with factories that prioritize quality over innovation or price. In fact, as mentioned by Loom, factories used to work for Fast Fashion brands are not focusing on creating quality clothing. It is therefore essential to clarify this question with manufacturers before partnering with them. Waste is a by-product of the manufacturing step. Partnering with factories which use technologies such as laser-cut machines can help reduce fabric scraps.

Finally, the collaboration with local groups is a great way to contribute to society while getting the job done: indeed, hiring students, people with disabilities or people in need of social rehabilitation enables them to gain experience, money and to benefit from social interactions.

3.4 Packaging

Packaging can be necessary for transportation purposes, but can be reduced or even suppressed in most cases. A series of specific guidelines to follow when implementing a circular economy model include:

- Suppressing single-use packages, especially when they are made of plastic (i.e. polybags).
- Packaging in batches instead of item by item to reduce the amount of resources used.
- Favoring cardboard to plastic, as its recycling process is less polluting.

— Choosing alternatives such as textile packages that can be reusable and are an attractive option for customers, or partnering with companies that offer sustainable, reusable packages such as Repack.

3.5 Transporting

To decrease CO2 emissions, it is necessary to thoroughly organize transportation in order to optimize it. To do so, the first thing to achieve is the optimization of transportation distances, at every step of the supply chain. Therefore, it is essential to choose suppliers which are located close to each other, to shorten as much as possible the overall supply chain. Moreover, favoring suppliers from Europe usually ensures good working conditions and wages for the workers. Next, it is necessary to optimize the packages as it will enable to reduce the number of trips made or the size of the trucks used to ship garments.

Several large companies also offer a green transportation option, ensuring that the CO2 emissions resulting from the transportation will be compensated. When possible, it is of course best to use sustainable transport alternatives such as public transportation, bicycle services (i.e. Hush Rush) or electrical vehicles. Yet, these options are usually only valid for small distances and limited quantities to be shipped.

3.6 Out of the Regular Supply Chain

There are other initiatives that a circular business in the fashion industry can take in order to reduce its impact. Leveraging the power of new technologies is one of them. Indeed, innovation in the tech sector can be applied to the fashion sector. For example, My Einfühlung is applying 3D design systems to the design of clothing and is also developing virtual reality to present its clothing collections. Those two ideas help to reduce textile waste and CO2 emissions resulting from the transportation of materials and garments.

Another concept to add to a fashion circular business is the shared economy model: launching a platform to rent clothes instead of selling them has several benefits for the planet, among which a reduction of resource consumption and waste production.

The marketing aspect of a fashion brand should also be addressed in a sustainable way. As the primary goal of marketing is to sell more, it is important to reflect on the use of it, or lack thereof, for a sustainable clothing brand. If one of the main messages of the brand is to reduce overconsumption, not making any marketing might be the most suitable option. Moreover, marketing costs can quickly become important,

therefore making the clothes more expensive. Reducing those costs can result in a more affordable line of clothes, accessible to a larger pool of customers. An example of an already established brand which has thrived without marketing is Veja, the French sneaker brand which produces sustainable sneakers made of responsible fabrics (Veja Website). The company manages to sell its high-quality, eco-friendly products at the same price as brands such as Adidas or Nike, simply by cutting marketing costs. In fact, in sneakers, 70% of the end price paid by the customer represents marketing endeavors (Battilana et al., 2020).

To reduce unnecessary purchases by customers, the pre-order concept is one that is worth thinking about, as pre-ordering pushes the buyer to reflect deeply about the necessity of his or her purchase, and also enables him or her to cancel the order at any time. Furthermore, pre-orders allow the company to produce only what is strictly necessary, therefore avoiding stock and the pressure to sell some items.

The funding aspect of the company cannot be neglected when building a sustainable business model. Indeed, it is critical to ensure that the people investing in your company are not only concerned by the revenues you will make, but will also take into account the environmental and social impact your brand has. If this is not the case, your company will constantly be forced to prioritize profits over people and planet.

Finally, in order to implement a circular business model in the fashion industry, it is essential to educate yourself to constantly innovate and find new ways to improve it. Sustainability cannot be achieved without thorough thinking and reflection.

3.7 The Impact of Circular Initiatives on the Environment and Society

The list of best practices explained above impacts positively the environment and/or society. The direct and indirect impacts of each initiative on the different environmental and social factors are summarized in the table on the next page, and then explained in further details.

The initiatives are classified according to the 5 steps of the supply chain used throughout the analysis.

	Impact	Environmental									Social				
Supply chain step	**Initiative**	Water use	Water pollution	Air pollution	Plastic use	Biodiversity	Land use	Quantity of raw material	Waste	Over consumption	Working conditions	Wage	Health	Living area	Quality of life
Raw material sourcing	Upcycling	D					I	D	D						
	Recycled material	D					I	D	D						
	Organic fibers		D	D	D	I	D						D	D	
	Plant-based fibers				D	D									
Design	Mono-fiber								D						
	Careful design	I					I	D	D	I					
	2 collections	I					I	D	D	D					
	Testing for quality							I	D	D					
Production	European factories		D	D		I					D	D	D	D	D
	Partnering with local communities										D	D			D
	Laser-cut machines	I					I	D	D						
Transportation	Optimized transportation		D	D		I									
	Short supply chains		D	D		I									
Packaging	Reusable packaging		D		D	I		D	D						
	Recyclable packaging		D		D	I		D	D						
	Optimized packaging		I	I	D			D	D						
Others	Renting	I					I	D	D						
	3D design	I	I	I			I	D	D						
	Virtual presentation	I	I	I			I	D	D						
	Marketing									D					
	Pre-ordering concept	I					I	D	D	D					
	Funding	I	I	I	I	I	I	I	I	I	I	I	I	I	I

D: Direct: Initiative A has a direct impact on an environmental/social aspect B.
I: Indirect: Initiative A has an indirect impact on an environmental/social aspect B, meaning that there is another initiative or impact C in between A and B.

In the first two steps of the supply chain, namely raw material sourcing and design, the initiatives primarily have an impact on the environment.

Indeed, by upcycling or using recycled material, the use of water and land is reduced, as no raw materials are sourced and therefore no water nor land is needed for agriculture. Moreover, no water is used for transforming the fabric, such as during dyeing processes, for example. Additionally, these practices decrease waste, even transforming it back to valuable materials.

The use of organic fibers[13] enables to reduce pollution and the extent to which land is used, as those are grown in a responsible way. It also enables to reduce plastic waste. Additionally, this practice impacts biodiversity, as nature is not harmed by any toxic products. Similarly, it benefits the health of the workers and the living areas close to the agricultural sites.

Using plant-based fibers enables to avoid the use of animal-based fibers, and also reduces the use of plastic.

In the design step, a lot of waste can be avoided. Indeed:

- The use of mono-fiber fabrics and the careful design of clothes ensure the clothes can be easily recycled.
- The reduced number of collections prevents unnecessary purchases.
- The quality tests limit clothes' defect and the need to dispose of them.

The design of clothes can also enable to reduce the amount of raw materials used, therefore impacting the use of water and land. If well designed, clothes will be used longer, which can have an impact on overconsumption. The design of a restrictive number of garments also impacts the amount of materials used, and has a direct influence on overconsumption. Finally, testing for quality ensures that clothes will be used longer, therefore not only reducing waste, but also overconsumption, and if considering people will globally buy fewer pieces of clothes, reducing the quantity of raw materials used.

By working with European factories to produce the merchandise, companies ensure their operations are respectful of the environment, which impacts water and air pollution, therefore having a positive impact on biodiversity. It also ensures that workers benefit from good working conditions, a decent salary and that the production does not impact the workers' health or the surrounding areas, therefore resulting in a good overall

[13] The term organic fibers is used in this context to refer to fibers which were grown in an ethical way, respectfully of the environment and society, such as organic cotton for example.

quality of life for workers and nearby communities. Partnering with local communities is also a reliable way of ensuring satisfying working conditions and wages are received, and that generally the quality of life of people hired is increased. During the production of garments, the use of laser-cut machines can help to optimize the consumption of fabric, therefore reducing waste from scraps, the quantity of raw material, and indirectly reducing the use of water and land.

Optimizing transportation and reducing the length of supply chains both enable to reduce air and water pollution, therefore impacting biodiversity in a positive way.

Conscious packaging (re-usable and/or recyclable) enables to reduce waste and raw material usage, especially the use of plastic. It also enables to reduce water pollution, as fewer plastic wrappings should end up in the ocean, therefore positively impacting biodiversity. Finally, the optimization of packages also enables to use less material and reduce waste. Furthermore, it indirectly impacts air and water pollution as optimal packaging enables optimal transportation.

Other initiatives such as renting platforms, 3D design and virtual collections all enable to reduce waste and the use of raw material. These last 2 initiatives also enable water and air pollution reduction, as garments do not have to be shipped when in a digital format. Marketing and the pre-ordering concept can both influence overconsumption. Pre-ordering also enables to produce clothes only for those who want them, therefore avoiding waste and the unnecessary use of raw material.
Finally, ethical funding does not have a direct impact per se on any of the environmental and social issues mentioned previously, but it allows companies to focus on solving them, therefore having an indirect impact on all of them.

Conclusion

The aim of this thesis was to answer to the research question: “How can the circular economy model lead to a more sustainable fashion supply chain?”.

The literature review revealed that the linear model of production and consumption results in terrible consequences for both the environment and society. Fast fashion giants such as Zara and H&M prone overconsumption through their business models, therefore stimulating customers to buy, wear, throw away, and then buy again.

People all over the world are starting to take heed of the crisis the planet is undergoing, and wish for more sustainable goods and services. Governments are slowly addressing those issues, but their impact is too small. The change must be achieved by companies themselves, as those are the ones producing and selling to the customer. Some businesses such as Puma, the Kering Group and Patagonia, have already responded to the wish for sustainability, each to their own extent, some brands being more engaged than others.

The circular economy model, contrary to the linear one, aims at reusing end-of-life products to create new ones, therefore creating a loop that the resources would follow, in order to reduce both the use of new resources and the waste of old ones. The circular economy applied to the fashion industry has the potential to truly reduce the environmental and social negative externalities it produces. The Ellen MacArthur Foundation, among others, provides guidelines on how to implement circularity in clothing.

After having reviewed the literature, it was concluded that it provides a rather theoretical answer to the research question. It was therefore decided to answer this question in a more tangible way, by analyzing four companies which have built their business model around circularity, namely My Einfühlung, Isatiò, Hopaal and Loom.

Information was gathered by means of interviews with the founders and some additional research on the five main steps of the supply chain: raw material sourcing, design, production, packaging and transportation. These insights enabled to draw a (non-exhaustive) list of circular initiatives. Finally, an analysis of their impacts on the environment and society along with a summary table was provided, therefore answering to the research question “How can the circular economy model lead to a more sustainable fashion supply chain?”.

Limitations and Future Research

The size of the company initially chosen being quite small, I realized it would be more suitable to investigate several companies. Yet, the lack of availability of some of the founders, as well as some specificities of their businesses, made me question the choice of these businesses further down the line. Before deciding on a specific business, it would have been wiser to ensure the founders had time to dedicate to the research and to investigate more thoroughly their activities.

Increased reflection behind the methodology could have allowed for a more solid derivation of results based on the insights gathered. The use of additional qualitative research methods or tools could have facilitated the analysis of the information and the development of conclusions.

Due to the nature of the companies I researched, which were quite small and with little means, they did not have the kind of data necessary to quantify the exact impact of their initiatives. Yet, I think that including a quantitative analysis to this thesis could add significant value to it.

Finally, I believe the root cause of the externalities discussed in this paper is not so much the way we produce, but the way we consume. I truly believe that in order to achieve sustainability, it is essential to reflect on our consumption habits, which are deeply embedded in the global, western-influenced culture. It is now essential to come back to an idea of "buying when it is necessary", instead of because it is the new trend, because last year's clothes are not fashionable anymore, or because you are too afraid the item will not be in store next week. Future research could focus on investigating solutions to turn away from consumerism and embrace a more sustainable and reflected buying behavior.

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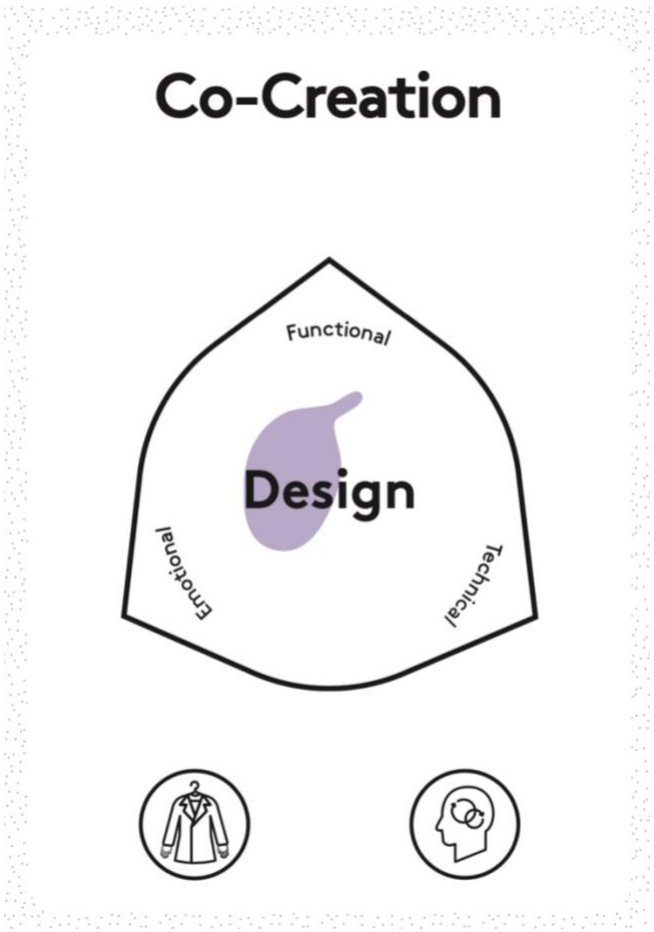
Appendix

a. Sustainable Design Card



Co-Creation

WHAT?
The design process is carried out, fully or partly, in collaboration with future users or other relevant actors.

WHY?
Co-creation can support product longevity:
1. Designing for user specific needs and desires.
2. Creating a sense of user ownership to product. Users are less willing to depart with products they have invested themselves in developing.

CHALLENGES
- Users may not be conscious about or able to articulate needs and desires.
- Temporal and/or financial limitations within the design process.

EXAMPLES
- **Birger Christensen**'s past practice of involving users in the design process via dialogue between designer, patternmaker and costumer in the shop and during fitting.
- **Lego**'s work with online user co-creation called Lego Ideas.

THIS CARD LINKS TO
/ Embedded Storytelling / User Understanding

FURTHER READING
Gwilt (Ed.) (2015). **Fashion Design for Living**. Routledge / Friis (2016). **Co-Creation Cards**. U-Press / Prahalad & Ramaswamy (2004). **Co-Creation Experiences: The Next Practice in Value Creation**. Journal of Interactive Marketing 18(3).

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b. Interview Questionnaire

How can the circular economy model lead to a more sustainable fashion supply chain?

Company questionnaire

- **Raw material sourcing:**
  - Which raw materials do you source? Why
  - How do you source them? How do you find your suppliers?
  - Are your raw materials certified?

- **Design:**
  - How do you design your clothes?

- **Production:**
  - Which methods do you use to produce clothes?
  - Who produces the clothes?
  - How polluting are the production activities? How do you track emissions?
  - What if the company gets bigger? How would you adapt the production model to keep it sustainable?
  - Are your processes certified?

- **Transportation/shipping:**
  - How do you transport your raw materials to the production sites?
  - How do you ship your garments to the end customer (B2B and B2C)?
  - Are your transportation means certified?

- **Packaging:**
  - How do you package clothing? Is it sustainable?
  - Do you have any packaging certification(s)?

- **Other:**
  - Are there any other activities that you undertake in order to make your company sustainable?

Do not hesitate to reach out if you have any questions.

c. Interview with Flavia Carbonetti, Founder of My Einfühlung

The interview was conducted on March 17th, 2020 via Skype.

Raw material sourcing:

- *Which raw materials do you use and why?*
  I use 90% of natural fibers; good quality of cotton, wool, linen, …
  The thing is 1m of 100% natural fabric is five times more expensive than fabrics such as polyester.
  I usually try to go to the original source of the fabric, to make sure it is 100% natural and that workers have good working conditions. Yet, traceability is hard to achieve, and this is why I prefer to use fabrics that come from Europe.
  Some fabrics are polyester (100% recycled) but I prefer natural materials (plant or animal-based).
  The fabrics I use are:
  - Cotton
  - Cellulose
  - Linen: this is my favorite because you can grow the fibers in Europe, I use the fabric with the "Master of Linen" certification, and it is very traceable.
  - Wool: same as linen, it is very traceable and I source it in Europe.
  - Bamboo and Tencel: grown in Asia, the fabric suppliers have some certifications.

- *Are there some certifications to the fabrics you use?*
  Certifications are usually very expensive as factories need to be audited for each new type of fabric (so every 6 months for a new season). They have to check energy consumption, water, waste, chemicals, … produced by the factory. Therefore, those fabrics are way more expensive. Yet, I work with some of them for linen and tencel.

Design:

- *Which methods do you use to design clothes?*
  I design the clothes by myself in Luxembourg. For the first two collections, I have been prototyping with some canvases, but for the new collection I have been implementing 3D design in order to save some fabric.
  At some point, I need one canvas prototype, but at least with 3D design I do not do 10 trials with fabric before having the right canvas.
  For now, I do not use prints because I have not found a sustainable way of creating them, but I am working on developing some water-based color solutions.

Production:

- *Who produces the clothes?*
  In Italy, a company handles the whole production. I sit down with them to discuss details and show canvases and so on. In-house they develop patterns, the 3D prototype and the real prototype.

The 1st collection for buyers is done in-house. Then, the bigger collection to sell in shops is done by a neighbor company which has bigger capacity.

- *How polluting are those factories?*
  They work a lot with laser cut machines and programming with computers to reduce waste. There are still some things that need to be cut by hand.

- *How do you plan on managing the growth of your company?*
  The aim of the company is to grow "sustainably" and to keep the same identity. I could think of producing some things in Spain and Portugal but the factories still need to have some certifications, and I would only do it for knitwear. Anyways, it would not make sense to relocate somewhere else, and I would prefer to keep it 100% made in Italy. Also, for the marketing aspect, having mass production would not help the product as it does not make it more desirable.

- *Are there any certifications from production?*
  The factories producing the clothes have a certification from the Italian Chamber of Commerce.

Transportation/shipping:

- *How do you ship your raw material to the production factories?*
  Both happen in Italy so those are usually small trips done by truck.

- *How do you ship finished products to Luxembourg?*
  Only the clothes that are done and ready for sale are sent through T-express (TNT), which is not an eco-friendly shipping process, but it happens only 4 times a year: once for the prototype and once for the collection, for each season (Spring/Summer and Fall/Winter).
  For now, it is difficult to use electrical vehicles due to their low autonomy.

- *How do you ship the clothes to customers?*
  Shipping to customers who ordered on our website is done through DHL with the Green option, which guarantees a neutral footprint.

Packaging:

- *How do you package?*
  Concerning the packaging to ship for e-commerce, I am thinking about it but there is not a lot of e-sales right now. I want to work with Repack but I need to sell more in order to do so.
  Now I am using "papier de soie" and paper and use a big stamp for the logo on bags. I do it myself so it gives a nice personalized touch and it enables me to avoid stocks of paper bags.

- *Do you have any certifications for packaging?*
  The materials used do not have any certifications. They are not recycled but not bleached either.

Others:

- *Digitalization and Virtual Reality*

  I am working on integrating digitalization and VR in my production process. I would like to be able to present collections in VR to limit production of garment especially for different colors. This way, if someone likes the collection and wants to buy it, I can produce it, but if not, I have not wasted any material.

  The digitalization of the whole collection is the idea, but it can be difficult because people like to see the feel of the fabric, the allure of the clothes and so on.

  Yet now, with the current Covid-19 crisis, this alternative is very interesting as all fashion-related events have been canceled and I could not present my new collection.

d. Interview with Jordi Tiò, the Partner of Isatiò's Founder

The interview was conducted on March 30th, 2020 via Skype.

Raw material sourcing:

- *Which raw materials do you use and why?*
  Any leftovers from the industry: scraps, samples, catalogues, basically anything that, in principle, does not have any commercial value anymore. We give those materials value back.

- *How do you source them? How do you find suppliers?*
  We have a network of contacts. We ask people around what they do with the remains of their fabrics. We only contact Belgian suppliers in a radius of 80 km, so this is a very small part of the waste that we save. Indeed, Belgium benefits from an important textile sector: there are a lot of tailor shops and so on.

- *Are there some certifications to the fabrics you use?*
  No, this is quite uncommon with upcycling. Indeed, if the fabrics we use were not certified initially, it is difficult to get it certified when we retrieve it, or it is very expensive.
  Yet, we got a proposition from students from the Université Libre de Bruxelles, who are working on developing a durability index, including the environmental and social impact of a brand, as well as the origin of the fabrics used, and so on. This could be interesting for us.

Design:

- *Which methods do you use to design clothes?*
  The design process is a very creative one. As we work with scraps of fabrics, we usually first have to sort them by colors, type, … Then, we have to go through a thorough reflection process to establish how we could create clothes with what we have at hand. Everything is done in our studio at home, by my wife Isa.

Production:

- *Who produces the clothes?*
  We work in partnership with ETAs (Entreprise de Travail Adapté), as well as students who quit school, rehabilitation centers, independent sewers. All of them from Brussels.
  The team is frequently changing so it can be difficult always to keep the same quality of garments.
  We also partner with design schools.
- *How polluting is the production process?*
  We use electricity for the sewing machines and the ironing, but it is partly green energy.
  Our workshop is in our house, where we have created a closed circuit for water, as well as a specific one for hot water, enabling us to decrease the waste of water that happens when waiting for it to turn hot. We are investing and making efforts to decrease our footprint as much as possible.

- *How do you plan on managing the growth of your company?*

There is no problem on a resource point of view, as there is so much waste in the textile industry in Belgium. For now, what we offer is a niche product. We are growing but very slowly. What is difficult to predict is how the market reacts: the demand is very volatile. We are currently investigating those fluctuations.

- *Are there any certifications from production?*
  We do not have any certifications.

Transportation/shipping:

- *How do you ship your raw material to the production factories?*
  We use a bike delivery system called Hush Rush, this way transportation does not emit any CO2.

- *How do you deliver your finished garments to the end customer?*
  Clothes are sold through different channels:
  - Private sales that we host in our workshop, so it does not need any transportation.
  - In two shops in Brussels, Yuman and Atom, where I deliver the clothes myself via metro (for Yuman) and through Bpost (for Atom).
  - In fairs and designer sales, where we usually take our clothes with us and use public transportation.

Packaging:

- *How do you package?*
  We use paper bags and silk paper when the customer asks for it, otherwise we try to avoid it.
  Right now, we are also working on integrating a Japanese technique called Furoshiki, which consists of packaging with fabric that can be reused.
  We use old IKEA bags to deliver clothes to shops, fairs, and so on.

- *Do you have any certifications for packaging?*
  No.

e. Comparison of Fast Fashion vs. Hopaal's Business Model

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