A Work Project, presented as part of the requirements for the Award of a Master’s degree in Business Analytics from the Nova School of Business and Economics.

IMPLEMENTING CIRCULARITY WITHIN THE APPAREL INDUSTRY IN THE EU

- Analyzing Barriers to Circularity and Investigating the Roles Companies Play in Overcoming or Reinforcing Them -

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14-12-2021
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Abstract
The fashion industry contributes to global environmental and social issues, where the essential
solution seems to implement a circular economy. Through the analysis of 7 companies in
different sizes, the paper analyzes fashion companies' role in the transition from a linear
economy to the circular one. First, the thesis investigated how each company has different
impacts and challenges based on the company's size. The study comprises five chapters,
starting with the methodology, followed by analyzing the barriers about start-ups, medium-sized companies and how big companies are reacting and overcoming those barriers. The final part summarizes the arguments discussed above.1

Keywords: Circular Economy; Apparel Industry; Circular Fashion; Barriers of Circularity;
Apparel Brands.

This work used infrastructure and resources funded by Fundação para a Ciência e a
Tecnologia (UID/ECO/00124/2013, UID/ECO/00124/2019 and Social Sciences DataLab,
Project 22209), POR Lisboa (LISBOA-01-0145-FEDER-007722 and Social Sciences
DataLab, Project 22209) and POR Norte (Social Sciences DataLab, Project 22209).

1 Note: According to Nova SBE submission guidelines, this document contains the individual part
conducted by Costanza Suriano of the Field Lab. Limitations, conclusion and future work related to
this paper are presented in the collaborative parts submitted by Nico Gemkow. For the other
individual part research conducted by Carolina Costa and Nico Gemkow please consult the respective
documents.
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A) Introduction

- NOTE TO READER –

The following chapter will serve as an introduction to the paper. Commencing with the personal interest and motivation of the authors, followed by an overview of the Apparel Industry and an introduction to the current industry trend of sustainability, it concludes with an introduction of the concept of circularity.

Interest and Motivation

Sustainability matters. In almost anything we do, produce or use, we rely on natural resources, and seeing as many of them are not infinite, preserving them is crucial. In 1987, sustainability was defined as “meeting the needs of the present without compromising the ability of future generations to meet their own” (United Nations 2021). We are said future generation(s), and it has become more evident than ever that human actions (and inactions) have dire consequences on the environment. Fortunately, there are theories, models, and initiatives offering potential solutions², that could theoretically dampen the much-feared global environmental crisis. Hence, the question arises why the speed and scale of implementation are still lacking. In September 2019, The UN Secretary-General António Guterres indicated we are losing “the race of the climate emergency” (United Nations 2021).

This emergency is self-evidently a vastly complex problem, entailing a plethora of interrelations, and therefore highly unlikely to be depicted and tackled adequately and in its entirety in a single paper.

Nonetheless, we recognized the urge for action and would like to contribute to a betterment of the current state of affairs. Not only by monitoring and improving our own individual consumption and behavior, but by having a small impact on a micro to meso level, as well.

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² Discussed in more detail in the following chapters Shift towards Sustainability and Circularity and Linearity.
Consequently, we set out to uncover the reasons for the lack of sustainable or rather circular business practices within a specific industry and to find out what role different players (consumers, companies, and governments) play. The reasons why we decided to focus on the apparel industry are manifold:

Firstly, its size. Being one of the world’s largest manufacturing industries (see
The Apparel Industry for more information), means it is putting a great strain on the environment; hence achieving circularity would create a significant positive impact.

Secondly, mostly due to changes in consumer behavior and demand, the apparel sector is one that adapts and develops rapidly; and, at least from an economic perspective, manages to do so relatively successfully (McKinsey and Company 2020).

Thirdly, first signals of intent can be observed, as selected brands are moving towards a more sustainable and environmentally conscious way of working, and more and more players are indicating their willingness to change to a more circular model for the industry.

Lastly, fashion fascinates many people, lets them express themselves, has the power to build up confidence and self-esteem, allows for self-realization, and provides an opportunity to apply creativity to one’s every-day life. Yet, despite, or even because of all the good it does, people often turn a blind eye to the environmental and social damage it causes.

By identifying common barriers that might discourage or prevent companies or other organizations from operating in a more environmentally friendly way, we hope to help those striving for more sustainable operations gauge under which circumstances chances for a successful implementation are at their highest, as well as to indicate what to consider when embarking on such a project. As this might speed up the development of circularity within the apparel industry, more and more consumers could enjoy the benefits of fashion without having to compromise the environment in the process – something, to which we would be glad to have contributed our part.
The Apparel Industry

The global apparel industry was valued at approximately 527.1 billion USD in 2020 and is expected to reach a valuation of twice as much by 2030 (Business Wire 2021). According to the World Bank, it is considered the world’s third-largest manufacturing industry (World Bank 2019).

It might therefore not come as a surprise that it also finds itself among the most pollutant industries in the world, emitting up to 10% of global carbon emissions (Ro 2020). For the purpose of illustration: Global aviation (including both, passenger and freight) ‘only’ account for 1.9% of greenhouse gas emissions (Ritchie 2020).

The apparel industry’s grave environmental impact does not limit itself to carbon emissions, however: it uses up to 93 billion cubic meters of water per year (UNEP 2019) to produce textiles, of which nearly 85% end up on landfills (McFall-Johansen 2020) and of which less than 1% is estimated to end up being recycled (World Bank 2019). Leftovers from the process of dyeing garments are often disposed of in nearby bodies of water resulting in the process being recognized as the world’s second-largest polluter of water (UNEP 2021). Even on the consumers side, apparel has dire consequences on the environment. 500,000 tons of microplastic are released into the ocean every year simply by washing one’s clothes (McFall-Johansen 2019), harming marine life and ultimately humans, as well (Royte 2018).

Hence, the use of copious amounts of water, generation of highly polluting microfibers, poor waste management, soils degradation, leaching of chemicals into natural environments, and emission of greenhouse gases, are only a few of the many problems to the environment caused by the fashion industry (Charpail 2017).

From a social standpoint, clothing is mostly produced in countries where human rights are often disregarded and working conditions are very precarious or even non-existent. Furthermore,
manufacturing facilities regularly move locations in search of the cheapest labor costs, paying less than the minimum legal salary, while forcing employees to work 14 to 16 hours each day, and omitting the need for health and safety working conditions (Charpail 2017). Child labor is also a very prominent problem within this industry and fast-fashion production.

Beyond the damage caused to society and the environment, from an economic point of view the linear approach also jeopardizes the supply of materials. The level and fluctuation of the raw material processes have significantly increased through the years, which doesn’t allow companies to make price forecasts, putting them in a weaker competitive position when compared to other companies that are less dependent on those materials (PGGM et al. 2018). Adding to this, the production process of many products depends on water and fuels, and as a result of this interdependence, the scarcity of one raw material will have a widespread effect on the price and availability of many other goods (European Commission 2020).

Yet, the worst aspect of aforementioned consequences is that they occur at an ever-increasing rate. From 2000 to 2014, clothing production increased by 100%; consumption by about 60% (Remy, Speelman and Swartz 2016). In 2000, the number of clothing collections per year was limited to two (based on an average of all European apparel companies at the time), while nowadays brands such as Zara launch up to two collections per month (Remy, Speelman and Swartz 2016). New players like the Chinese brand Shein even got rid of clothing lines completely and shifted to a constant stream of new designs, partly generated by algorithms scrambling social media for trends and potential consumer demands (CB Insights 2021). Fast Fashion, defined as the mass-production of cheap, trendy, and disposable clothing (Tan 2016), taken to extremes. Other examples of this “ultra-fast fashion” are the American brand Fashion Nova and the UK-based company PrettyLittleThing, who, being able to launch between 500-2,000 pieces of clothing a day, have already started taking significant market share from (fast fashion) brands like Zara and H&M (Walk-Morris 2021, McKinnon 2021). The seemingly
infinite variety and up-to-dateness encourage people to buy large amounts of low-quality apparel that quickly become obsolete as fashion trends come and go (Mender 2020). These quicker manufacturing and shipping methods, consumers’ increased purchasing power and their hunger for ultra-up-to-date products have made shopping for clothing a common form of entertainment nowadays (Hayes 2021), translating into a serious threat to sustainability.

Shift towards Sustainability

Fortunately, awareness of the impact the fashion industry has on environment and society, is growing among stakeholders – predominantly investors and consumers. As a consequence, companies are under increasing pressure to improve their policies and adapt their business models (PGGM et al. 2018).

Environmental, social, and governance (ESG) criteria are a set of operational requirements used by socially concerned investors to analyze possible investments (Investopedia 2021). Despite the fact that these criteria have been of secondary importance to investors, a recent study found that they are nearly globally top of mind for numerous investment leaders when assessing the impact of their portfolios nowadays (Eccles and Klimenko 2019). By doing so, investors can avoid companies that may represent a bigger financial risk as a result of their business practices. In order to adapt to this shift in focus, companies need to present integrated financial and ESG reporting to investors. From an organization’s perspective, disclosing this type of information represents a competitive advantage since it shows that managers are monitoring their businesses’ risks, becoming more attractive to investors (Pritsch, Stegemann and Freeman 2008).

Furthermore, there has been an increase in government legislation to ensure that the impacts of fashion brands on society are reduced, and not complying with current and future regulation poses a legal risk for companies (PGGM et al. 2018). Initiatives like the Task Force on Climate-
related Financial Disclosures offer a variety of regulatory and market incentives to help corporations become more aware of their impacts and incorporate this knowledge into their business or investment decisions (PGGM et al. 2018). Nevertheless, in many regions these regulations are still voluntary, with no legal consequences if organizations fail to meet the guidelines (Huckle 2021). Even though there have been some positive developments at the industry level towards sustainability, some fashion retailers are culpable of greenwashing their brands and lacking transparency as a way of attracting more conscious consumers without actually changing any of their production methods (Ho 2021).

On the consumer side, and in agreement with a survey carried out by McKinsey & Company, the commitment to sustainability has deepened during the COVID-19 crisis, as Europeans demand that fashion companies act more responsibly and consider the social impact and environmental aspects of their businesses (Granskog et al. 2020). Younger generations are the ones leading this movement, with Generation Z embracing sustainable fashion much faster than other age groups (Elan 2020). Accordingly, there has been a significant shift on customers’ fashion consumption patterns which is reflected in the ongoing expansion of the second-hand clothing market. This market is currently worth 36 billion USD worldwide and is estimated to reach a valuation of 77 billion USD in 2025 (Shahbandeh 2021).

The second-hand apparel market comprises activities such as exchanging, renting, and reselling clothes, which are all methods of owning pre-existing products rather than purchasing new ones (MacGilp 2021). Besides buying and selling second-hand clothing through physical stores or online platforms, another business model is on the rise: fashion subscription boxes (Colon 2020). Some fashion enterprises have started to provide monthly memberships that allow customers to borrow clothes rather than buy them. For example, Rent the Runway, a leading subscription fashion service that allows clients to rent designer styles, has introduced the
“Unlimited” plan, which allows customers to borrow as many pieces as they like each month via a rolling subscription (Pike 2016).

In addition, there are many start-ups helping fashion brands to create their own resale programs online, reducing the mass production of new pieces. Thanks to this, clients have the possibility to resell and extend the lives of fashion garments in their wardrobes. For instance, the London start-up Reflaunt is assisting the NET-A-PORTER’s pilot launch of their online space where customers will be able to use the wide resale offer to send their pre-owned and well-preserved pieces to a new owner (Farra 2021).

The increasing employment of new concepts is one indicator that industry players are starting to take the previously mentioned shifts and external forces more seriously. Other sustainable initiatives are beginning to spread, as well. Italian technology company Vegea created a fully recyclable, vegan leather alternative by using waste products of a different industry – wine (Kohlbacher 2021). Boston start-up Galy manages to grow cotton in a lab, from cells instead of plants, and with a process that is 10 times faster than traditional farming (Kart 2020). Converse, Adidas, Nike and many more have started offering vegan shoes made out of recycled plastic (Stanton 2021), Patagonia sells jackets made out of old fishing nets (Martinko 2021), and H&M, together with TextileGenesis are experimenting on weaving blockchain enabled traceable threads into garments to guarantee a more transparent supply chain (Krebbers 2021).

Besides new products used in the fashion industry to make it more environmentally sustainable, there are also many processes being developed with the same goal. One example is Loop, a new in-store recycling system, where water, materials and dyes are not wasted. On the contrary,

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3 For objectivity, it should be mentioned that some of these innovations might be used for greenwashing purposes and must be taken with a pinch of salt. It also holds true, however, that merely because a generated impact is relatively small, or one could do more, it does not necessarily qualify as greenwashing. Since it is a matter with high potential for subjectivity, we refrain from taking a stand here as to whether mentioned examples might be cases of greenwashing.
the process is based on eight steps where old items are used to create new ones. Looop starts with shredding old pieces continuing with sewing a new one with old fibers. This new technology was recently installed at an H&M located in Stockholm (H&M Magazine 2020).

Another recent process is the creation of 3D digital models for the fashion world, where extra water, carbon dioxide and textiles are no longer requested, because it is completely done online. This innovation enables fashion designers to adapt their prototypes based on customer demand, as the model can be produced and modified in a few hours. In fact, companies are oriented to modify production processes into virtual ones aided by AI given the strong impact it has on reducing pollution during manufacturing processes. For instance, Stitch Fix, the British personal styling service creates a new clothing line based on AI algorithms to launch new styles and trends (Davenport 2021).

Furthermore, when discussing innovative discoveries to reduce dye usage for the creation of a new item, Colorifix is a good example. The British start-up produces bacterial colonies capable of generating color pigments which are later used to create new items (Taas 2020). The process used by Colorifix starts with the identification of a bacteria capable of producing a certain pigment, and then, the gene responsible for the color is extracted and inserted into the DNA of a bacterial culture specially produced by researchers to optimize pigment production (Taas 2020).

Nonetheless, while all these examples are important steps towards a greener apparel industry, it is still not making a big enough difference to change the tide. As the UNECE puts it, it is “imperative [to] embrac[e] circularity” (UNECE 2021).
Circularity and Linearity

In a circular economy, the value of products and materials is maintained for as long as possible, waste production is reduced to a minimum, and when products reach the end of their useful life, they are kept in the economy to be reused or recycled as a way to generate value once again (European Commission 2015). The Ellen MacArthur Foundation, a UK-based charity promoting and further developing the circular concept, concretizes it as “a systemic approach to economic development designed to benefit businesses, society, and the environment” (Ellen MacArthur Foundation 2020). All the positive environmental aspects aside, circularity is expected to present a multi-trillion-dollar economic opportunity, too - for those willing to embrace it, that is (Ellen MacArthur Foundation 2020). Consisting of three fundamental principles, being ‘designing out waste’, ‘keeping products in use’, and ‘regenerating natural systems’, the circular model aims to reduce the discharge of carbon dioxide and other polluting gases, to ensure that materials are produced with the aim of being used more than once, and to promote and enhance renewable resources – eventually, creating a better world for the future (Ellen MacArthur Foundation 2020). Furthermore, circularity plays a key role in the achievement of several social, economic, and environmental goals of the 17 SDGs outlined by the United Nations (2021), particularly SDG 12, which promotes sustainable consumption and production. Circular activities can also support other SDGs such as SDG 3 (ensure healthy lives and promote well-being for all at all ages) through the reduction of waste and pollution, SDG 11 (make cities and human settlements inclusive, safe, resilient and sustainable), and SDG 13 (take urgent action to combat climate change and its impacts). In addition, there are symbiotic relationships between some of the SDGs and the concept of circularity, as some of the goals provide opportunities for the Circular Economy to thrive. For instance, SDG 9 (industry, innovation, and infrastructure) offers an opportunity for organizations to develop circular technologies, improve their processes, and become more resource efficient.
As opposed to the described circular approach, a linear economy follows a “take, make, dispose” model (Taylor 2020), meaning that raw materials are extracted from nature, transformed into products and services, and finally discarded as waste (Rood 2017). This business model assumes that there are infinite available resources on earth, and its economic value is generated from selling as many products as possible (Heeseung 2021). Since the Industrial Revolution our economy has been dominated by a linear model (Rauturier 2021) which has long been associated with environmental, social, and economic problems. Companies that operate under a linear economic approach are more likely to employ non-renewable materials that eventually will become scarce for their operations, fail to cooperate by keeping strict control over knowledge, and fail to innovate or adapt to changing market conditions (PGGM et al. 2018). All these effects of linear business practices will negatively impact an organization’s ability to thrive in the long run. The fashion industry is not an exception.

The incentives to move from a linear to a circular economy can differ, ranging from creating a more competitive economy, or meeting the needs of the world’s population growth, to complying with climate strategies and targets (Isles 2021). The European Commission took the lead on this transition with the early adoption of the first circular economy action plan in 2015. The deriving Circular Economy Package entailed 54 specific plans, many of which have been executed already, the remaining being in the process of implementation (European Commission 2020). Joss Blériot, the head of public affairs at the Ellen MacArthur Foundation, claims that there is a combination of negative circumstances in Europe – stagnant economy, lack of resources, and waste management problems – that has prompted these regions’ institutions to embrace circularity as a new way to foster sustainable economic growth (Isles 2021).
B) State of the Art and Literature Review

- NOTE TO READER –

Concluding the previous chapter, it seems clear that embracing circularity is the only way forward. As an attempt of figuring out why the needed transition is not happening faster, the following chapter focuses on different types of barriers to a circular economy, analyzing peer-reviewed, academic literature and industry reports.

Cultural

A study by Deloitte and the Copernicus Institute of Sustainable Development (CISD) of the Utrecht University identified cultural, technological, market and regulatory barriers as common inhibitors to the implementation of a circular economy in Europe (2017, 6).

While a reference to a correlation of said barriers and a deriving threat of chain reactions is made (Kirchherr et al. 2017, 6), the cultural aspect was regarded as the most prominent and most difficult to overcome.

Organizational

On an organizational level, change-reluctant company culture paired with conservative linear supply chains often only allow for minor improvements, whereas a more holistic approach would be needed to achieve circularity (Kirchherr et al. 2017, 7). Alana M. James, Lizette Reitsma and Mersha Aftab came to a similar conclusion in a recent publication, claiming that the integrated “positioning of circular strategies in the product lifecycle” (James, Reitsma and Aftab 2019, 904) is key for a successful circular implementation. According to them, however, the problem lies less within the reluctance towards the incorporation of sustainable practices
(2019, 903) and rather within the “isolated focus to circularity” and the lack of a “systems thinking approach” (2019, 909).\(^4\)

Revealing another potential barrier, James, Reitsma and Aftab claim that this might at least partly derive from companies’ shortfalls when it comes to a proper understanding of the principles of circularity (2019, 911): Two of the five brands participating in their study had implemented a take-back scheme in their stores, promoting an extension of their garments’ product-lives. Customers were rewarded for their participation with discounts for future purchases, incentivizing an increased consumption (James, Reitsma and Aftab 2019, 909). If not done on purpose to greenwash their brand image, it does indeed suggest a knowledge barrier.

To circumvent greenwashing, ease the monitoring of progress towards a more circular economy, and ensure the effectiveness of related national, as well as EU-wide interventions, the European Commission has deemed it important to have “a set of reliable indicators” (European Commission 2015, 20). Companies seem to share this sentiment, realizing the importance of adequate metrics to quantify the effects their sustainable approaches have (Walker et al. 2018, 13). Yet, there seems to be a lack of standardized key performance indicators related to circular activities (Jia et al. 2020, 6). Despite some companies already measuring how much value is being created by their (supposedly) circular practices, said valuation is sometimes difficult to compare cross-industry, as it is linked to individual definitions of circularity (WBCSD 2018, 6). According to an analysis on circular metrics, performed by the World Business Council for Sustainable Development at 39 selected companies, 74% of the respondents claimed that their organizations have their own frameworks

\(^4\) It is worth noting, however, that this conclusion is based on observations conducted within a Research Development and Innovation Department of an organization that is not mentioned by name and therefore does not allow for statistical sound inferences.
to measure circularity (2018, 6). This can be justified by the complexity and subjectivity of defining indicators that measure reduction, reusage, and recycling of waste on different industries (Potting et al. 2017, 11). As an aggravating factor, some brands outsource their production processes and are therefore not able to fully monitor the complete supply chain in terms of sustainability (Shen and Chen 2019, 757).

**Consumer**

Apparently not exclusively organizational, the earlier mentioned knowledge gap seems to exist on the consumers’ side, as well. Deloitte and the CISD report a lack of interest and awareness in consumers and establish that current consumer behavior does not reflect the concept of circularity, as they are uninterested in purchasing durable products (2017, 7). Many consumers prefer style over sustainability (Brydges 2021, 4), which can be partially explained by the correlation between materialism and happiness. According to a report on how consumer engagement can drive circularity, around 22% of participants affirmed that they are happier if they own more material possessions (GlobeScan and GreenBiz 2019, 5).

James, Reitsma and Aftab are convinced that consumers are crucial in the shift towards a circular economy (2019, 911), and explain the mentioned lack of interest with consumers missing the feeling of meaning or value towards a given clothing article nowadays – especially if it is second-hand. This leads to carelessness, an increased readiness to dispose of the garment, or, in the case of second-hand apparel, even to a resistance towards buying it in the first place (2019, 904).

When analyzing the willingness to buy second-hand clothing items “all of the time” and “most of the time” in different age groups of consumers, Generation Z (25%) and Millennials (21%) are more open to purchase previously owned pieces than older generations Generation X (15%) and Baby Boomers (12%) (GlobeScan and GreenBiz 2019, 6). However, even though younger
generations are more prone to acquire second-hand clothing, older generations are often content with less items (GlobeScan and GreenBiz 2019, 6).

According to a report published by the Green Economy Observatory of the Bocconi University, the recovery of secondary raw materials, and with it the market of recycled goods, is often held back by the difficulty of getting end consumers to accept products with lower performance (Iraldo and Bruschi 2015, 11), indicating that some consumers associate recycled and second-hand items with inferior quality.

Additionally, consumers do not repair their garments like they did a few decades ago, claiming that nowadays it is cheaper to buy a new item rather than fixing it (European Commission 2018, 85). This is partly owed to the fact that today’s consumers do not possess the necessary skill to repair the items themselves, which holds true especially among the younger generations (ING 2020, 6).

While this impeding behavior might reflect that of the majority of consumers, a recent report by the ING allows for a more positive outlook, revealing that 83% of the 15,000 respondents (5,000 of which from Europe), believe their own behavior and personal choices can make a difference on tackling global environmental challenges (ING 2020, 4). The research also found a widespread acceptance of recycling initiatives on the consumers’ side, as well as a steady shift from fast to slow(er) fashion in the consumers’ mentality. This movement seems to be most pronounced in Europe with 54% of the respondents claiming to regularly recycle their clothes (compared to respondents from North America (49%) and APAC (37%)). Furthermore, 38% of Europeans claim to regularly repair their clothes and 20% indicated they buy pre-owned clothes. Moreover, a majority of the 25,000 people asked world-wide, affirm

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5 It should be noted that in this type of research (structured interviews, surveys) there is a risk of response biases, such as the social desirability bias. Nonetheless, even if it should have occurred it still indicates a positive shift in consumer behavior.
they would be willing to pay a higher price for products and services that are better for the society and the environment (51%) or are produced in a socially or ecologically conscious way (50%) (GlobeScan and GreenBiz 2019, 8). In addition, nearly half of the interviewees (49%) say they support brands who speak openly about social and environmental matters and inspire others to be more environmentally aware (GlobeScan and GreenBiz 2019, 8).

Market

Deloitte and the CISD found that industry players perceive the low price of new supplies and primary materials and costly upfront investment expenses to be the main market constraints (2017, 7). The low price of new supplies allows for cheaper and, therefore, more competitive pricing of the final garments, whereas circular enterprises that replace fossil-fuel based plastics with bio-based plastics are often forced to sell at higher prices and have to re-position themselves accordingly. The costly upfront investment expenses are assumed to derive from an “unperceived market potential” of a circular economy (Kirchherr et al. 2017, 7). Claiming that “the first one that will invest in learning [about implementing Circular Economy] will probably lose money and only the second mover will earn a fortune.” (Kirchherr et al. 2017, 7), many organizations are waiting for others to take the first step instead of trying to benefit from first mover advantages.

Understandably, not all barriers seem to exist for all sizes of businesses to a similar extent. For instance, the investment needed to analyse and quantify carbon emissions per garment, to assess life cycles and to ensure traceability of supply chains represent a much bigger hurdle to smaller businesses, as they have less (financial) resources, time, and capacities as their bigger counterparts (Brydges 2021, 3). Especially so, as these are merely the initial steps of a more sustainable or circular strategy development.
Regulatory

According to the research by Deloitte and the CISD, policymakers do not seem to present a significant barrier to circular economies, as companies and governments ranked it as the 5th most relevant barrier out of five (2017, 8). This does not imply that governmental barriers do not present any threat at all to the implementation of circularity. In fact, the European Commission itself published a report in 2016, analyzing regulatory issues that hinder circular progress (European Commission 2016). As one of the most prominent hindrances, the report mentions the insufficiently regularized collection and pre-treatment of waste streams (European Commission 2016). This, leading to mixed waste, makes recycling more difficult and therefore more cost-intensive for those willing to include recycled materials in their production processes.

Another obstacle stems from legislation mandating specific quality requirements for recycled materials to protect consumers (European Commission 2016). While well-intended, aiming to protect consumers’ wellbeing, it does occasionally complicate circular approaches imposing too many restrictions on companies willing to use recycled goods (European Commission 2016). What makes matters worse, is that said legislation might differ from one EU member state to the other (European Commission 2016) making it even more arduous to abide by for internationally operating companies.

In a whitepaper on barriers and enablers to circular business models, Allard Pheifer mentions trade agreements as institutional barriers to circularity (Pheifer 2017, 15). Seeing as many were originally developed to purely stimulate economic progress and did not include minimal requirements for sustainability, they now allow “highly competitive linear products to enter the market” (Ibid), against which the often less competitive circular products do not stand a chance.

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6 Seeing as government officials have participated in this data collection, it should be noted that this might have led to a partially subjective result.
Technological

When questioned about the five most relevant barriers, governments and businesses did not consider technological barriers as a significant obstacle related to circular implementation (Kirchherr et al. 2017, 7). According to the authors, this represents an optimistic finding since technical advancements can be extremely slow, and it would take significantly more time to implement a circular economy would specific technologies first have to be developed (Kirchherr et al. 2017, 7). In independent research, conducted a year later, “not a single technological barrier [was] ranked among the most pressing circular economy barriers” (Kirchherr et al. 2018, 264), confirming the minor role technological inhibitors play in the circular transition. In fact, several technologies from the 4th Industrial Revolution have, intentionally and unintentionally, contributed to circular practices (Bianchini, Rossi and Pellegrini 2019, 3). For instance, the replacement of physical products with virtual services such as e-books and digital music platforms allowed a significant reduction of waste. However, when it comes to recycling clothes there is still a lack of effective technologies available on the market (Koszewska 2018, 8; McCarthy 2016), as well as a lack of technological capabilities that would be required to develop recycling initiatives in-house (Brydges 2021). The complex combination of materials used during the production of clothes, which in turn makes the separation process very difficult (Beall 2020), can lead smaller brands to shy away from trying as they feel simply overwhelmed (Brydges 2021, 6). Additionally, when recycling, most of the clothing is sorted manually, which has many disadvantages such as the inability to classify and separate materials, leading to high costs and slow, as well as non-standardized operations (Nørup et al. 2018, 12). These factors contribute to merely 1% of waste being transformed back into garments, 12% being recycled into low-value goods like wipes, insulation materials and mattress filling, and the remaining 73% ending up on landfills or being burnt (Remy, Speelman and Swartz 2016, 5).
Infrastructural

In a 2015 technical report on guiding principles and case studies related to circular economies, infrastructural characteristics are mentioned as a barrier to circularity (Iraldo and Bruschi 2015, 11). The large distances, extended geographical boundaries, and complex world-wide shipping logistics, caused by ever increasing globalization, make the implementation of the so-called reverse logistics a strenuous task (Ibid). Reverse logistics describe the process of products flowing upstream from consumers to then re- or upcycle or re-use them (Paras and Pal 2020, 1). What hinders the growth of implementation specifically within the apparel industry, as compared to other consumer goods, is the availability of fashion products at extremely low costs (Ibid).

COVID-19

COVID-19 caused the European apparel industry turnover to decrease by 20% and global industry profits by more than 90% (European Commission 2021, 3), pushing brands to prioritize short-term actions fostering immediate financial upturn over long-term circular initiatives.

The Ellen MacArthur Foundation, however, is convinced that it is now more relevant than ever to embrace circularity and that a circular transition could effectively help reboot economies (Ellen MacArthur Foundation 2021, 7).

Next to the negative economic consequences, the COVID-19 pandemic had significant social repercussions, as well. While certainly not pleasant occurrences, the fact that the “lack of respect and ethics” (European Commission 2021, 3) in some production facilities and the increasing imbalance of power among different players within supply chains have become more visible to the wider public, has a positive side to it, too. As social justice is becoming
more relevant for consumers, there is an industry-wide notion that a more sustainable and circular way of working is urgently needed (European Commission 2021, 1).

Need for Further Research

Upon analyzing previously discussed findings, it was decided to propose a different structure on the matter, to avoid risking potentially overlapping analysis. Instead of further researching the implementation of circularity considering cultural, market, regulatory, technological, and infrastructural barriers, the project was divided into three perspectives: a consumer’s, company’s, and governmental point of view:

- Cultural barriers seemed to differ significantly depending on whether one would look at it from a consumer perspective or an organization’s, which is why it was already split accordingly in this literature review.
- Market related characteristics, too, could be divided into those stemming from companies’ actions and those from consumers.
- Regulatory specifics represented the third perspective - the public sector, later referred to as ‘policies, regulations, and governments’.
- Technological and infrastructural barriers were primarily business related.
- COVID was seen as an exceptional type, which had impacted almost all the above to some extent.

To see whether consumers, the private sector and the public sector represent more of a barrier or more of an enabler to the implementation of circularity within the apparel industry, each author investigated one of the three newly defined areas.
C) The Role of Apparel Companies (Individual part)

Methodology

Understanding the necessity for a fashion industry company to apply a circular model into the core business model and the crucial role of each company, it became fundamental to analyze how every company approaches this transition and the difficulties they face in implementing it. Although the existing literature (see B) State of the Art and Literature Review) exposes and analyses the barriers a company has encountered in incorporating circularity into its business model, the following chapters inspect what kind of difficulties are often faced by start-up’s, mid-sized companies and large corporations. The study presented has been portrayed to focus on the theoretical part of the work seen from the companies' point of view, examining and deepening several practical cases involving small and large companies. In order to describe the following different situations of implementing circularity, information has been obtained thanks to research on institutional sites of the companies, interviews, and articles in sector magazines. The first round of data consists of sustainability reports and websites concerning the Circular Economy that has dealt with events and initiatives that have involved the companies involved in the research. In addition, the study reports specific interviews conducted with some of the brands via video call, which courteously and promptly answered, providing insights and more detailed information. To specify mediums used include Zoom, Teams and Email.

Seven fashion firms have been examined: Orange Fiber, Thalie Paris, Save the Duck, Inditex, Gucci, Napapijri, and another brand that preferred to remain anonymous. Each company is characterized by different business models, background and circular footprints; within this study, each section presents the company's history, why it was chosen for this analysis, then the study of the barriers encountered. To structurally expose, the examination starts with the
inspection of two start-ups, followed by the one of a specific medium size company, and then the big firms, concluding with a summary of similarities and differences. The goal is to study the seven businesses based on barriers in terms of topics and categories well described in the State of the Art and Literature Review. In order the analysis follows those barriers: the cultural block focusing on the organizational part, the market price issue, regulation blocks, technology, and concluding with the lack of circular measures. Afterwards, the analysis of each obstacle faced by different companies and the explanation of how they each overcome it. This analysis aims to present a transparent paper and further encourage fashion companies to pursue the integration of Circular Economic models in their businesses. The goal is to underline the barriers associated with this transaction in order to prevent them or turn them into opportunities.

Focus on Start-ups

- NOTE TO READER –

Considering the term 'startup' as a newly founded company, which is still in the early stages of brand management, sales, and hiring employees, the analysis focuses on start-up without a strict limitation of timespan (Van Dijk et al. 2015).

As noted from different articles and news, thousands of new start-ups built in the past decade are mainly focused on the transition from the linear to the Circular Economy (Jennifer Rudden 2021). They are favored over mature companies since they come to light already with an innovative circularity-oriented business idea. Therefore, this study has chosen to analyze two new start-ups where the concept of circularity is already present in their businesses. The first one is Orange Fiber, a producer and supplier of raw materials, the second one a French brand known as Thalie Paris. Both are completely different businesses with the concept of circularity integrated from the company's birth, alongside with the diversity of many other features. The paragraph explains the difficulties of the start-ups when congruent together, otherwise
separately. The inquiry has been designed with a brief introduction by emphasizing their impact on the Circular Economy, then a detailed examination of barriers and how the brands overtake them.

*Circular Initiatives of Small Companies*

The first start-up to take into consideration is Orange Fiber. The entity is an Italian company that develops innovative yarns and fabrics using citrus processing waste, obtaining a sustainable material. The idea of this new brand is to respond to the high fashion brands' need for innovation by reusing by-products that the Italian orange processing industry produces annually (Santanocito, Adriana Maria 2021). It all started in 2014 when the two founders, Adriana Santonocito and Enrica Arena, did a study jointly with an Italian university, this study was converted into a global patent a few years later (Ibid). Many international collaborations have led to the firm being more reliable from a legal point of view. Consequently, the brand switched from a start-up to a small, medium-sized company, becoming more international. It is necessary to emphasize that the below chapter will analyze the barriers to implementation since the company was a start-up.

Secondly, the French brand Thalie Paris was created in 2020 by Nathalie Dionne, with the idea to compile the minimalism Parisian style with sustainable luxury and while considering the Circular Economy. Thalie Paris was born to be 360 grades sustainable towards all the sides: design, production, and distribution. The principal goal of the founder, Dionne, is to promote recycling into the fashion and luxury industry through her brand (Thalie Paris 2021). Since the small company was created only a year ago, it still has all the characteristics of a start-up, so it will be analyzed as such.
Deep Dive into Barriers

Based on internal information provided by the companies, quantitative data was obtained to expose a more in-depth analysis of the main barriers that both start-ups have encountered to become circular. Due to this information and to internal reports from the other company, cultural issues were not detected (Dionne 2021, Arena 2021). The two brands are entirely new, where sustainability and circular economy factors dominate their business model. As one of the founders well notices, “There is no need for a change in mentality and to revolutionize an already established organization” (Arena 2021). This concept is well explained because both start-ups are young corporations composed of concerned people about environmental topics. Moreover, as mentioned in the literature review, the young generation is more engaged on sustainable fashion and circularity in products, as already expected according to the findings in Part B (see B) State of the Art and Literature Review).

Moreover, Orange Fiber initially had financial issues which were solved through the creation of a crowdfunding, attracting Business Angels, and involving institutions with this innovative business ideas (Orange Fiber 2021). On the contrary, from the written interview is clear that Thalie Paris personally creates the brand (Dionne 2021). The brand does not have regulation, law issues or financial problems since the owner has personally invested a significant amount and is taking care of it (Ibid).

The analysis was mostly focused on the price factor that many companies underline to create 100% sustainable products. Thalie Paris faces very high manufacturing costs and other competitive brands (Dionne 2021). The French brand understood that customers appreciate innovation due to sustainable materials, even if at the beginning it was hard to convince them about the value of the items. Similarly, Orange Fiber also had a big challenge in scaling up the market and optimizing production costs. The long process about citrus requires time and
money, the primary need is to attract investors who believe in the project and support innovation sustainably while keeping in mind the brand’s requests and preferences (Arena 2021).

Overall, during the utilization phase of the products, the interviews clearly emphasized that the consumer comes first, representing the most important lever to drive change. However, a significant issue came out. The brands had to reassure their buyers about their investment in sustainable materials (Dionne 2021, Arena 2021). To do so, Thalie Paris’s team solved it by investing most of the budget in marketing and communication advertisement, such as social media platforms and events (Dionne 2021).

After considering the consumer issues, it has been found from research and video calls that companies have problems measuring the circular KPIs. Regarding this topic, the two brands adopt different methods to do so. Orange Fiber can keep track of these measures' indicators since it is more developed (Arena 2021). Unlike Thalie Paris which cannot evaluate the carbon footprint even though the team studies it by questionaries to all their suppliers (Dionne 2021). The future idea of this last brand is to test their new collections through artificial intelligence and then produce only the models' people like the most reducing waste (Ibid).

To conclude this first section, the interviews emphasized that different concerns. The Italian company is worried about having difficulty expanding their products outside Europe due to logistic reasons (Arena 2021). Differently, the French team believes the brand could face future manufacturers' problems by continuing to use new innovative materials, where new machines could block the production process. They are worried that the fabrics cannot keep up with the demand (Dionne 2021).

‘Save the Duck’
After analyzing the start-up fashion world and their difficulties of incorporating circularity into the company's strategy, the research has shown that middle size companies have other barriers. This subpart is based on an interview with a Sustainability Manager of the brand Save the Duck, which perfectly explained the topic.

*Circular Barriers faced*

From the interview came out that the brand was settled in 2012 by Nicholas Bargi, who had previous experience in his father's fashion company (Mazzanti 2021). He created a completely sustainable brand inside the Forest clothing group, where circularity is their extra competitive value, which excludes the brand from the circle of companies that enforce cultural barriers. Contrary to what was written in the Part B (See B) State of the Art and Literature Review). In this specific case the company did not need to teach their employee the circular concept, because Save the Duck did not need to move from a linear to a circular economy, being born as such.

The idea is to propose something innovative, new concerning ethics guaranteeing no harm during the production of the garments. For this reason, the pillars in which Save the Duck are based on love for animals, respect for the environment, and people. In 2019, after receiving a significant sustainable certification, the firm grew in popularity (Save the duck 2021).

Focusing on Circularity, the firm is engaged with Bocconi University while working together with other companies to define the best KPIs to monitor Circularity along their value chain, overcoming the lack of performance metrics and making the KPIs the same for several companies (Mazzanti 2021). After identifying the KPIs, the union of companies together with Bocconi University analyze the fashion market to put them into practice and conclude the process by proposing new solutions and strategies (Rinaldi et al. 2021).
Afterwards, during the video call, the Manager underlines the massive problem, not on brand’s responsibility: laws, which are not completed, not specified for the fashion industry, and different from one country to another (Mazzanti 2021). This issue makes it hard for the firm to create new sustainable collections since they must adapt and control the materials and processes to each country. Meaning that brands take care of making different prototypes based on the laws and demands of the population and government recommendations of the country in question (Ibid).

After web research, it was discovered that the brand is well known for puffers. Even under the control of a bigger brand, the company faced issues about technology with creating a new collection based on sustainable materials such as nylon. A few years ago, they made a nylon prototype, but it was not that wearable and stylish, and, for this reason, they decided to drop the project (Mazzanti 2021). Companies are moving towards a circular model, but they need to sell new items that are up to the expectations of the market (Ibid). From the Manager's point of view, this barrier is the main one and the one that is never remembered. During the creation of the nylon prototype, Save the Duck designers’ team had some technical issues (Ibid). The interviewee mentioned that the brand team is now creating a wholly recycled collection, with one hooded jacket 100% sustainable(Ibid). The main difficulty is about the last part of the product, in detail how to recycle a product(Ibid). More specifically, it is not tricky for Save the Duck to create a sustainable item because it started to develop products with sustainable materials or at least a traits value chain of sustainable raw materials (Ibid).

During the Zoom call, the person interviewed added that the price barriers are not that significant for the company since during the last years the prices of recycling materials have been decreasing (Mazzanti 2021). For this reason, in the Sustainable Manager’s opinion this is not a concern for Save the Duck(Ibid). This is well explained because they utilize sustainable
materials from their origin, therefore they do not have to change price (Ibid). Consequently, price and cooperation with stakeholders are not perceived as barriers (Ibid).

Overall, the circularity task and challenge are to keep improving their eco-design and create products as efficiently as possible to be disassembled (Mazzanti 2021). That specific part of the process is complex for the firm (Ibid). As already mentioned, Save the Duck is well known for puffers, which requires a lot of stitching, a massive difficulty for the circular model (Ibid). The production team is trying to leave the product as simple as possible to avoid complications in the re-use process (Ibid).

In addition, the Manager mentioned relevant insights about customer behavior, which is considered a relevant barrier (Mazzanti 2021). Save the Duck’s team has discovered that the brand’s products have a long life (Ibid). They found that many pieces from the first collections are still seen on the streets, proved by different logos from the current one (Ibid). These analyses underline that their items last over ten years since they are still used (Ibid). Hence, it is certified that Save the Duck creates long-life objects. This fundamental topic to achieving maximum sustainability leads to a complex issue: how to recycle the product at the end of life (Ibid). The firm cannot control who holds the product at the end of his life (Ibid). In somehow, they try to educate their consumers by giving them suggestions to maintain the quality of a product (Ibid). Indeed, they propose selling or giving as a present or donating for charity the item, which they can have a second life (Ibid). Instead, for those damaged pieces can’t be of second-hand, transform them and give them a second life (Ibid). To conclude, the brand has no power after purchase (Ibid).

Circularity in Big Companies
The analysis presumes that big companies have a certain number of employees in its structure, and they have a positive annual turnover every year.

As previously mentioned, the analysis is descriptive and based on qualitative data collected through various sources. The text started from the information gathered during different interviews with members of big companies and from the web; some of them asked to remain anonymous. Based on those, the barriers related to Circular Economy have been outlined to display the difficulties encountered by each company to implement circularity. To effectively present the difficulties of each company and their orientation on circularity, the inquiry has been designed as follows. It is decided to consider barriers in terms of topics and analyzed, based on each obstacle, if the company addressed the difficulty and how it overcame it. In addition, the various interviews found that each company also experienced concrete brand barriers; these will be mentioned at the end to conclude this section. Below a brief history of the brands interviewed in this section is presented:

- **Gucci**: founded in 1921 is one of the world’s best known and influential luxury brands nowadays part of Kering Group. The House is known for its eclectic and contemporary creations that are an expression of Italian craftsmanship, unsurpassed in terms of quality, attention to detail and innovative design (Gucci 2021).

- **Napapijri**: an Italian premium casual brand owned by a giant fashion-sporty colossus, VF Corporation, which was created to make alpine travel bags. However, the brand has changed by moving to markets focused on apparel for men, women, children, accessories, footwear, and bags (Napapijri 2021).

- **Inditex Group**: a Spanish multinational textile manufacturing and distribution colossus founded in 1963 and based in the north of Spain, precisely in Corunna. By 2015, the Group was operating more than 7,000 shops on five continents and planned to increase the number, mainly through fast fashion brands (Inditex 2021).
• Anonymous luxury brand: the respondent requested to remain unknown as the brand itself.

Implementation of Circularity

After a brief introduction of the interviewed brands, the barrier analysis focuses first on the decision of a brand to implement sustainability and in detail circularity into the business model. Precisely, Gucci chose to consider the topic in 2015 when, as it turned out from the interview, the sustainability team set several objectives to reach by 2025 including the reduction of 50% of the company's carbon emissions, helped and controlled by the Kering group (Bardelle 2021). During the same year, Napapijri also made the first decision towards ethical fashion, prohibiting the use of furs and down used for the creation of new pieces, creating a completely new department into the company (MacArthur 2020). Considering the anonymous luxury brand that, in contrast with the previous examples, had sustainability as one of the pillars in the business model since its foundation which made the implementation of the circular model more straightforward. Concluding with Inditex, this had to change such a colossal group's business model entirely. They inserted a new sustainable team in each brand controlled by the headquarter, where new initiatives are being studied and implemented (Sebastiani 2021).

Overall, most brands are trying to change and move towards circularity in everyday activities, even if luxury brands are more focused on fashion and luxury, and the sustainability aspect is a plus. However, when creating a luxury piece, the industry's core faces issues in implementing the new model; they will choose the luxury aspect, leaving aside the circular topic (Bardelle 2021). In addition, in order to hide the fact that they are not oriented to implement the circular economy, some brands are launching partially circular projects only to increase their reputation. Others are not willing to change their business models due to the high costs associated with it (Anonymous 2021). Fast fashion brands are the ones suffering the most with
this transition because sustainability and circularity goes against the concept of fast fashion itself. To reach the goal of a Circular Economy, fast fashion brands are focusing more on all the activities coming after the production. The idea is to achieve something close to the concept of circular because being a fast fashion firm makes circularity hard to apply (Sebastiani 2021).

Circular Barriers in Detail

According to the literature review, to have organized and structured study, the analysis follows the different described barriers, such as the cultural one, the price issue, the absence of regulations, the difficulty with technology, and the lack of circular measures.

First, the cultural barrier was considered by a Deloitte source the most prominent and most inhibitors to overcome (Kirchherr et al. 2017, 6). Starting with Gucci, the Kering group has greatly helped mitigate cultural issues. It emerged from the interview that the process is only partly because they believe that it is hard to apply to a luxury firm such as Gucci. Kering tried to educate consumers and employees through training, workshops, and webinars to sensibility workers and inform them about avoiding damages (Bardelle 2021). This is the first step since, as the anonymous brand interviewed and the Inditex staff mentioned, many consumers do not know what it means to be circular and how necessary it is (Anonymous 2021, Sebastiani 2021). Focusing on the organizational cultural issues, the big firms have these obstacles hugely. Otherwise, the anonymous brand added that it is necessary to mention the dichotomy between management and the creative mind in the fashion world. Circular products usually do not satisfy design requests. Most of the time, they cannot reach the quality level they expected, or there is no possibility of doing other processes on the product. This aspect makes it more complicated for consumers to accept lower-performance products (Anonymous 2021).

Correlated to this, the second barrier referred to the market and the price war is more decisive when discussing sustainable materials. This block has damaged the fashion market for a long
time. Since those pieces generally cost more than the previous ones, this has destroyed the typical business price model because it has been hard to understand consumers that pay higher prices for a sustainable product (Anonymous 2021, Bardelle 2021, MacArthur 2020, Sebastiani 2021). Understandably, lower prices generally incentivize people to buy, but this does not occur with luxury brand but with fast fashion ones. Overall, many fast fashion brands prefer to continue using not-recycled materials because items created with sustainable materials are sold less and more expensive. As mentioned by the Napapijri member of the sustainable team, if a product is not sellable, it doesn't even make sense for it to be created. Concluding, firms must balance the price with the feasibility of selling the product (MacArthur 2020).

Third, to analyze the implementation of circularity in big companies, the chapter has been structured to examine the barriers to regulations; firms need to establish a new series of critical measures since everyone confirmed that the rules are vague and unclear. In addition, each country has its law referring to different targets and KPIs, which usually block some processes. For instance, the Gucci member of Costumer Social Responsibility interviewee underlines that the brand must adapt various regulations for each country operating, making the production process slower and hard to perform. Since each country have different technologies implemented, it is complex because they must continuously adapt each product to every regulation (Bardelle 2021). In contrast, Napapijri does not consider this incisive issue for the company (MacArthur 2020). The anonymous fashion brand operates in the British world, and the interviewee said it is generally clear and understandable what the brand must follow regarding circularity regulations (Anonymous 2021).

According to the online interview, the President of Napapijri, called Timo Schmidt Eisenhart, underlines that technology is an important barrier to implementation. As an example, new machines are required to process new materials, that are huge costs to be faced by companies. (MacArthur 2020). For this reason, big brands are searching for materials compatible with the
old machinery to avoid more costs. To overcome this, Gucci’s staff found a new substitute for leather, which processes in the same way as the typical leather (Bardelle 2021). In addition, recently, Napapijri discovered nylon 6, made possible by collaboration with partners and suppliers (MacArthur 2020).

Moreover, Schmidt Eisenhart believes that the main success of circularity is the collaboration, which made the realization feasible. This transformation is possible if brands work together from departments and with other brands and outside partners (MacArthur 2020). The anonymous brand mentioned that usually, the production of most big companies is outsourced, which could represent a problem related to educating the manufacturing suppliers (Anonymous 2021).

The last barrier is related to the lack of measures which was proven by some of the companies not having circular measures. Many companies create groups such as SDA mentioned before to have general KPIs to control circularity (Anonymous 2021, Bardelle 2021, Sebastiani 2021).

To conclude this paragraph, the study mentions that each company also underlines others’ issues during the calls, that will not be analyzed in-depth in this study. For instance, Gucci staff highlight the barrier to the brand’s logo, which the brand faces in reusing visual tools (Bardelle 2021). Then, Inditex quoted issues about being a fast fashion brand. Answering to very high demands quicker makes it hard to create all the pieces with sustainable materials. For this reason, they prefer to leave aside the circular part to focus on the sale (Sebastiani 2021). Then, the anonymous brand faced the obstacle of competition between brands, where firms, especially luxury, prefer not to share information regarded circularity because they are worried about losing their competitive advantages. Although this central problem is an issue that has existed for years in the fashion world, jealousy and the idea of sharing are not very accepted in the apparel environment (Anonymous 2021).
Similarities and Differences

In the last chapters, the analysis underline relevant insights from the companies' point of view depending on their size. The topic was analyzed in small start-ups, medium companies, and concluding with large companies, discovering that the barriers have been addressed and overcome in a completely different way.

From the analysis it was conclude that cultural barriers are not an obstacle for start-ups and mid-sized companies, such as Save the duck thanks to the presence of the circular concept in the roots of this company. However, this is a significant barrier for big brands since not everyone conceived the theme as relevant. Usually, this was solved through education and mentoring to employees or with the help of the most prominent partners.

The monetary barrier to the implementation of the Circular Economy is more felt in start-ups than in large companies. Start-ups and mid-sized companies asked for money to business angels or large outside investors who believed the business would not fail. On the contrary, big ones do not needed these financing. The barrier they may face is competing with other large and non-sustainable companies that sell at a lower price. As pointed out in the ‘Save the Duck’ case, the price barrier is not so harmful, as the costs of sustainable materials are decreasing over the years.

Regarding the lack of well-defined laws, it is an unclear topic for all companies regardless their size. There are different laws for different countries and some interaction laws. The argument has not been thoroughly analyzed since none of the companies interviewed knew how to answer in a spiky way on the discussion. As a result, it is often difficult to follow the recommendations of each country, as the companies must adapt the product to the different environments, making the production process more expensive and time-consuming.
In some cases, the single companies or aggregation have created internal measures to calculate circular KPIs. As this factor is relevant for future developments and success of circularity, companies are cooperating to share information and invent international guidelines to measure their performance.

Overall, the technological barrier has perhaps been the most incisive for most companies, contrary to what was expected based on Part B (see B) State of the Art and Literature Review). On one hand, start-ups are worried that technological barriers could halt the production process. On the other hand, large companies require different types of machinery because the previous ones were not suitable for sustainable materials. To avoid the purchase of new structures, large companies have conducted a lot of research to obtain a suitable material. Differently, start-ups have often tried to solve the technological issue by asking for big companies' advice which were unwilling to provide information and share processes.

Concluding, below is the summary of the barriers analyzed in the seven businesses focusing on their relevance for each company (Figure 1).

Figure 1: Importance of cultural, market, monetary, regulatory, and technological barriers in each company (Suriano 2021)

<table>
<thead>
<tr>
<th></th>
<th>Orange Fiber</th>
<th>Thalie Paris</th>
<th>Save the Duck</th>
<th>Gucci</th>
<th>Inditex</th>
<th>Napapirji</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural/Organizational</td>
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<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Market</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Investment</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Regulatory</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Lack in measurement</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Technological</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

1 = Company finds barrier unimportant or not faced; 2 = Perceived barrier but not crucial; 3 = Critical barrier

D) Conclusion

- NOTE TO READER –
While this (concluding) chapter is required to be a joint effort of the authors, the three roles of ‘Consumers’, ‘Apparel Companies’, and ‘Policies, Regulations, and Governments’ were investigated individually. For better readability, it was therefore decided to first conclude the individual parts in a separate manner before subsequently connecting the findings under Reference source not found.

Conclusions regarding the Role of Consumers

To conclude, there is a clear attitude-behavior-gap between consumers’ willingness to engage in circular practices and their actual engagement. When asked in the second section about their contribution as individuals and readiness to engage in circular practices in their daily lives, most respondents showed willingness to embrace both. However, their answers from the third section show the opposite. When interrogated about circular practices such as buying secondhand clothing items, using clothing rental services, or upcycling their clothes, more than half of the participants replied they have not done it or that it is not a viable option for them. In fact, of all the circular practices presented in the survey, only ‘repair’ seems to be put into practice by most participants. Moreover, fast fashion brands are still respondents’ number one place to go shopping and their main purchasing drivers – price, quality, and versatility – do not reflect social or environmental concerns nor the application of the Circular Economy concept. Even the period of time most respondents keep a piece of clothing in their closets – 5 years or less – is below the average of 5.4 years. Furthermore, the feelings of happiness that most respondents try to find in new clothes lead to unplanned purchases that often translate into people buying items they do not really need. Nevertheless, the frequency with which most respondents buy new clothes – seasonally or only when they need to – and their main motivation to do it – needs – show a more positive view. Finally, the survey confirmed that women and younger generations, in particular Generation Z, are the main enablers of the Circular Economy. Overall, the Circular Economy still has a long way ahead until it will be
widely accepted and implemented by consumers, but the fact that younger generations will represent a larger part of the population in the future may be an optimistic sign for the future of the Circular Economy.

Conclusions regarding the Role of Apparel Companies

Potentially the most relevant finding is the differing perception of barriers when considering different types and sizes of businesses. Start-ups generally face higher financial barriers related to funding (as in the case of Orange Fiber) or manufacturing or advertisement costs (as in the case of Thalie Paris), whereas bigger companies face fewer financial uncertainties but can find themselves undecided whether to implement circular strategies or focus on business as usual. SMEs and Start-ups in turn, are less prone to such cultural difficulties, as sustainability or even circularity are often engrained in their core. They can seem to take their role more seriously, tracking circular KPIs or at least planning to do so in the near future, whereas some bigger companies – particularly fast fashion brands – seem to perceive sustainability more as a compulsion to satisfy a general public and occasionally fall prey to implementing only partially circular projects or sustainable initiatives with adverse effects such as essentially promoting further consumption.

Other relevant barriers to mention that were able to be validated are regulatory issues\(^7\) slowing down sustainable process and customer behavior.

Conclusions regarding the Role of Policies, Regulations, and Governments

\(^7\) The interviewee did not provide more detailed information as to what kind of issues specifically the SME was facing.
All three of the discussed administrative levels allocate a significant share of their efforts towards enabling, facilitating, supporting, and promoting circular initiatives. Due to a perceived correlation of reduced complexity and successful implementation, it is primarily cities and municipalities that also participate directly in circular efforts. National and international bodies rather deal with ensuring that the right framework conditions are in place by developing and passing policies and regulations. Their active participation is often limited to a networking and connecting role, as city-level interventions are not as easily adapted on national or international level.

While all levels aim to be an enabling force for circularity, the risk of inadvertently taking on an inhibiting role is highest on national level. The smaller the scale of application, the easier it is to gauge potential adverse consequences. On an international (EU) level these adverse consequences can be damped easier than on a national level, as EU policies are not legally binding and laws that are (e.g. European Climate Law) leave enough grey areas to provide for some leeway in avoiding them.
While the three roles discussed in this paper have been investigated separately, in reality they are very much interlinked. They can influence each other into acting in a more inhibiting or supporting manner and it is safe to say that one alone will not be able to bring about the much-needed change. To illustrate this interconnectedness, the following figure was created:

**Figure 1:** Interconnectedness of the Roles (Gemkow, Costa and Suriano 2021)

If they can achieve a certain level of alignment and support each other by taking on responsibility and by playing an active part in the transition, a more sustainable and potentially even circular fashion industry could, at least theoretically, be pulled off. However, reasons suggesting it to be rather unlikely to occur in the near future are manifold.

A European circular apparel industry is impossible as long as supply chains span across several continents and even if de-globalizing European fashion could be done, it could not happen without significantly harming trade along the way. To achieve true circularity in the industry
one would therefore have to attempt it on a global level. Yet, not only are the interrelations of the plethora of entities in the various (partially untransparent) supply chains significantly too complex to be successfully redesigned at once - political motivations from outside the EU are also playing an inhibiting role.

Potentially one of the most crucial aspects however is the roles passing the responsibility to one another: On public sector level exists the notion that consumers (, whose behaviors, even within the more developed countries in the EU, can be described as far from sustainable) will not change their consumption patterns unless they are forced to. From a consumer’s point of view, it is being argued, that as long as apparel brands put profit over social and environmental concerns and continue to produce cheap clothes, it is unlikely that consumers will feel encouraged to change their patterns. Apparel brands on the other side have voiced concerns as to whether consumers even fully understand circularity and doubt their willingness to put sustainability first when considering a purchase. Both assumptions could be confirmed via the conducted consumer survey. Consumers have a limited understanding of the range of circular activities, still prioritize price over every other factor, and regard the potential impact of their individual actions as too insignificant compared to that of the other two roles.

While this is by no means the only ‘doom loop’, it is the view of the authors that implementing circular practices or attempting small scale circular ‘economies’ should definitely be continued, as an increasing number of sustainable initiatives will slowly but inevitably lead to a more sustainable apparel industry
E) Limitations and Future Work

Limitations

The size of the research team can be seen as a general limitation, as more researchers per role or sub-topic would have allowed for more extensive research. More interviewees and survey participants could have been found, resulting in more statistically valid inferences, for instance. Most of the limitations however are role-specific:

Related to the Role of Consumers

Related to the survey conducted, which served as one of the primary sources for Part C, the main methodological limitations are the sampling bias and the statistical relevance of the sample size. Due to an uneven distribution of genders, age groups, countries, and levels of education, results cannot be generalized for the entire European population. Regarding gender, the sample is biased towards women. Generation-wise it is biased towards Generation Z and Millennials, lacking representation of Generation X and Baby Boomers. In terms of current country of residence and level of education, the sample is biased towards Portugal and bachelor’s degrees, respectively. Nonetheless, the linear regressions indicated that the last variable does not account for much of the variation of the dependent variables in each regression model. In other words, there is no correlation between the level of education and the answers to the 3 chosen questions.

Furthermore, the survey itself presents some constraints such as possible subjective interpretations of the questions and respondents potentially not being completely honest when answering.
**Related to the Role of Apparel Companies**

A limited number of companies and circularity strategies have been analyzed. It is therefore not possible yet to fully understand the entirety of barriers involved in the implementation of a circular business model and their potentially varying relevance for different types of businesses.

**Related to the Role of Policies, Regulations, and Governments**

The presented examples of governmental intervention, regulations and policies by no means aim to provide an all-encompassing overview of possible actions governmental institutions could take. There are more examples of governmental intervention (governmental funded organization, start-up accelerator programs, initiatives and more) but the ones discussed were found to be among the most relevant to showcase the different roles governments can play in the circular transition.

Some of the highlighted examples are not specifically related to fashion due to a limited number of circular governmental examples on each administrative level and the fact that many policies and regulations deal with circularity (as well as circularity related issues such as waste management and recycling) on a cross-industry base.

With regards to the conducted interviews a quantitative comparative analysis of the findings was not possible as different questions were asked per interview. Nonetheless, this was done deliberately, as it was perceived as more relevant given the nature of the chapter and its research methodology.

The limited number of interviewees might decrease the objectivity of the findings, although the chapter aims to present a predominantly fact-based view and uses the interviewees opinions merely to emphasize a point.
Future Work

Possible future research areas include but are not limited to:

- Researching how to overcome the discussed barriers to circularity.

**Related to the Role of Consumers**

- Researching in other countries with more people from different age groups to potentially discover other consumer habits and behaviors.
- Researching how to raise awareness about the Circular Economy among consumers through a standardized definition that applies globally.
- Researching how to make each consumer believe that their individual actions make a difference and can have a positive impact.
- Researching how to motivate and/or incentivize consumers to integrate more circular practices into their daily lives.

**Related to the Role of Apparel Companies**

- Researching other private sector players than apparel companies, such as recycling or logistic companies or investors.
- Researching barriers in different countries to identify more general ones applicable to every kind of environment and separate them from relatively specific ones.
- Researching the role of suppliers, their point of view, and how potential barriers inhibit their practices.
- Researching laws related to circularity that companies must comply with in terms of relevance and ease of abidance.
- Researching the evolution of circular initiatives to better understand what companies are likely to face when developing and implementing them.
Related to the Role of Policies, Regulations, and Governments

- Researching each EU member states’ trade and environmental legislations to identify potential bottle necks.
- Researching each member state to find out where within the EU it would be easiest to implement a circular economy.
- Researching specific member states to identify ideal environments and characteristics for circular projects on a city and municipality level.
- Researching the roles of other international and national institutions, including non-European ones to provide a comparative analysis.
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Interviews


Appendix

Appendix A) Transcript of Interview w/ Anonymous – Sustainability Partner

Costanza Suriano = CS

Anonymous entity= XX

**Presentation:** The Sustainable Partner requested to remain anonymous.

**CS:** Tell me about the sustainable strategy and the primary keys to the circular economy?

**XX:** I have been working as a Supply Chain Sustainability Manager in a luxury fashion brand world for 5 years, where sustainability is one pillar. CSR strategy is embedded overall in the strategy of the company. From the brand manager, there is a reduction of collection aiming to reduce the waste to reach the motto "buy less, choose well, make it last", that the luxury is following. In order to produce less, there is a rethinking of the portfolio of products and constant research of the development of materials. The idea is to reduce impact, making sure the supply chain is treatable, transparent, and circular. On the environment side, there is a big project of reducing effect not just on the final project but changing the elements that bring the product to the costumers, such as packaging, logistic levels, warehousing, and retail level. So, there is a circular project related to the retail level. At the same time, continuous work is also on the measurement of the company's environmental impact. They are ongoing a project about CFO, meaning the organization's carbon footprint.

**CS:** About the metrics you just mentioned, are they internal or international measurements about sustainability?

**XX:** As for now, the company is not quoted, so they don’t have an obligation to publish the Sustainability Report every year, so the British company is not aligned at the GRI, which is something they are planning to do. For this reason, the brand is using internal metrics. Still, they are part of the community of Monitor for Circular Fashion from Bocconi SDA, where the group is trying to standardize and have a guideline regarded circularity. Simultaneously with UNC guidelines of transparency and feasibility, one of the company's last projects this year.

**CS:** What about the barriers to regulations? Did you encounter some that blocked the creation of sustainable products?

**XX:** As for now, the company is not quoted, so they do not have an obligation to publish the Sustainability Report every year. Moreover, since it is a British company, it is not aligned with the GRI standard. For this reason, the brand is using internal metrics. Still, they are part of the community of Monitor for Circular Fashion from Bocconi SDA, where the group is trying to standardize and have a guideline regarded circularity. Simultaneously with UNC guidelines of transparency and feasibility, one of the company's last projects this year.

**CS:** Was it hard to change the mind and the habits of the employees and change the company's culture?
XX: There is always a dichotomy between management and the creative mind in the fashion world; circular products do not satisfy design requests. Most of the time, they cannot reach the quality level they expected, or there is no possibility of doing other processes on the product. For example, the style of the circular textile cotton may not reach the same level as the virgin one, such as impure, it is different to the touch. Also, the leather section sometimes cannot always guarantee the level of performance of the original materials. So, there is a trade-off, but especially for this specific brand, it was easier to educate employees because they already had it into the pillar for the business model. At the same time, it is always a matter of cost and how to reach the products you want to get by using better potencies. There are many opportunities, and selection is vast, but many years ago, it was different.

CS: Does the company has any issues regarded technology or investments?

XX: Most of the production is external from the brand, which could be a problem for manufacturing suppliers. I am not sure about this question. Although there is an awareness of the topic, the suppliers understood the importance of investments, research, and technologies. For example, the brand was involved in a pilot project with United National on traceability and transparency. As a result, they could align their partners from the spinner to the manufacturer, all the supplier chains to work on a specific project supported by blockchain technology. They invested time and money in the project because they understood the importance.

CS: Was it hard to compete with competitors with lower prices?

XX: The company's primary market is the UK, and the company does not want to show as a traditional sartorial brand, but it is very creative. The war of prices has destroyed the fashion market because it has been tough to put into the mind of the consumers that pay higher prices for a sustainable product. The social component is very distant from the concept of sustainability in the end consumer, which is sad that people think this because it is something they should care about. At the same time, the brand is not competing with that because the company's strategy is not in the circle of the company with a lower price. So, the is not much competition with the more inferior brands. Since the brand is categorized as a luxury brand, we have a particular target/range of consumers. My team and I are educated about the brand and circularity into the business model.

CS: Do you have any idea of new coming barriers to create/to move on the circular economy?

XX: If there is a lack of traceability, the company could overcome a future barrier. I believe this is the main barrier for a circular approach because if you are not aware of materials and chemicals ingredients come from and the process involved. So, you have kind of a partial circular model in the end. There are many trades off, such as the level of quantity and the minimum of certain materials to be produced. Sometimes, this limitation is very high, so many brands could be left out and not enter the purchase. Then, another future barrier could be quality issues. Companies are not ready to implement the complete circularity internally with the new process, such as distribution or second-hand reselling on the website. So, for those new approaches, the manager has to consider the strategy must be the new one, that could be a risk or a new way of working. Most of the population does not mind the fundamental concept behind circularity; the people don’t know the difficulties to implement it. There are many projects that luxury is launching but sometimes are capsules, there are very small or not extending to the whole collection, but it is just a part. Most of the time, huge brands are doing it for reputation and because they try it. Sometimes they want to launch a new sustainable collection and sponsor the new material, but it is one aspect of a big chain. So, there is not a
complete revolution yet of the market. In my personal opinion, many suppliers are working to be circular. Still, they are not structured internally to support the new processes, and those who are vertically integrated are advantaged. Many other brands are not very aligned with the strategy. Then, most companies do not know how to or when to implement it. Competition in luxury brands exists, and she agrees that many luxury brands don’t want to share too much information because they are worried about losing the competitive advantages. So long the year this competition is decreasing because they are creating community, where they tried to work together, no competition as before regarded information. It has always been like that, especially on the production side. But since circularity is a new topic, there is a lack of knowledge and opportunities. I believe that for that cooperation and connection, circularity works.
Costanza Suriano = CS
Enrica Arena= EA

Presentation: Enrica Arena is the co-founder of the small Italian company called Orange Fiber.

CS: Did you and your team find any specific barriers to implementing the business model based on a circular economy?

EA: No, because the company is small and founded with sustainability in the core business.

CS: Was it hard to change the mind and the habits of the employees and change the company’s culture?

EA: No, we are a new corporation with the same values, so we didn’t face this issue. Therefore, there is no need to change the mentality and revolutionize an already established organization.

CS: How is the company measuring the metrics to be circular enough?

EA: We got a patent a few years ago, so for this reason, we can measure the circular facts and their impacts on the environment.

CS: What about the barriers to regulations? Did you encounter some that blocked the creation of sustainable products?

EA: Not really.

CS: Did Orange Fiber have any issues regarded technology or investments?

EA: Some years ago, we created crowdfunding, with whom we received enough money to continue.

CS: Did the company find any infrastructure problems about the locations of production of materials?

EA: Not really.

CS: Was it hard to compete with competitors with lower prices?

EA: Yes, we had some problems scaling up the market and optimizing the production costs.

CS: Do you have any idea of new coming barriers to move on circularity?

EA: We are worried about the expansion.
Costanza Suriano = CS
Bianca Maria Bardelle = BB

**Presentation:** Bianca Maria Bardelle, Sustainability Manager in Gucci, she has been working in the company for the past year.

**CS:** Tell me about the sustainable strategy and the primary keys to the circular economy?

**BB:** Everything started in 2015 in Gucci when the sustainability team set all those objectives to reach in 2025 to reduce the company's carbon emissions 50% for scope 1 and 2 and 40% for scope 3 of the Global Greenhouse Gas Protocol. The GHG [https://ghgprotocol.org/standards] protocol was created to measure and manage carbon emissions across the value chain to control demand to take climate action. Scope 1 represents all the direct greenhouse emissions from sources operated or owned by an organization. Scope 2 explains how corporations measure emissions from purchased or acquired electricity, steam, heat, and cooling. Then, the scope 3 standard is the only internationally accepted method for companies to account for these value chain emissions. That specific reductions are Gucci's ambition. To reach it, they have been implementing thousands of initiatives, from changing all materials of the supply chains to finding more sustainable materials for changing all the packaging in plastic and making sustainable events. They are trying to change and move on circularity in everyday activities. It is necessary to underline that Gucci has the big group Kering above them, which set high goals in terms of sustainability. The sustainability team is considered a support team to all the firm's team; they work together. Some projects concerning a particular circular economy aim to reach something close to circular because being a luxury firm makes the circularity hard to apply. The basic assumption is that Gucci goods will be reused and last for an extended period. Gucci has different ONGs abroad to recover all the trash from production. I have to underline that the main obstacle is the logo. It is not possible to reuse something branded for other property laws, which Gucci is also facing in reusing visual tools, such as all the materials and items in the stores (tables, shells, chairs). Most of the time, those products contain the Gucci logo, so they keep it in stock in their warehouses for future reuse, but in the end, it is challenging because they constantly change the windows and the design of stores. Moreover, in the end, they destroy it. Gucci set the circular plan, which is part of the strategy of Gucci in 2015, and they decided to reach the goal in 10 years.

**CS:** Was it hard to change the mind and the habits of the employees and change the company's culture?

**BB:** The Sustainability Gucci team interfaces with all the functions of the group. It has been challenging, but many people now feel sustainability, especially the employees. Usually, the different teams ask CSR staff for support to suggest how to change staff to be more circular and make better choices for raw materials. Kering indeed helps them with training, workshops, and webinars either to sensibility workers or to inform them about avoiding damages. She underlines that Gucci is a luxury and fashion company, so the main business focuses on fashion and luxury. However, when the industry's core faces issues implementing a circularity, they
choose the fashion side. For example, suppose they have to produce packaging ready in one month, and it is impossible to make it with sustainable materials. In that case, sustainability is set aside, like in the background. Gucci tried to move to circularity: for example, the new type of leather made of sustainable materials and animal-free. The materials are undoubtedly similar but not equal. However, there are a lot of studies about circularity into the Kering level, but also at the Gucci level. For example, in Kering, this lab focuses on alternatives to find sustainable solutions, good texture, and good quality. It is challenging for Gucci to be 100% sustainable, especially about the leather for bags and shoes.

CS: Does Gucci have any issues regarding technology or investments?

BB: Sometimes they face mechanic issues; for example, they had some machines for production because each device is working only with specific material. And when they change those materials to a more sustainable one, some machines don’t work with them. So it is necessary to change the devices, and it costs a lot. Gucci solved it with a new material that processes the same way as typical leather. For us, this had a significant advantage.

CS: What about the barriers to regulations? Did you encounter some that blocked the creation of sustainable products?

BB: Sometimes regulations block some processes. I have to mention the brand issues again because, from the legal point of view, everything that is reused or recycled can not be branded. So, for example, Gucci is destroying all the packaging from past collections to recycle them. But to do this, they need to crack them, and this process must be controlled in every step. This is a considerable obstacle for Gucci because they need money, people, and time to do the procedure. Another example is when they donated products because all the items are branded, and for legacy laws, they are not allowed to do it, they show it deleted the logo, and again these costs for the company.

CS: Are you agree that some brands are not willing to share information about new processes and new materials to become circular?

BB: I'm afraid I have to disagree with it. In the Kering group, there is information sharing and tries to learn from what the other members already implemented and found out. Kering, to help other companies implement circularity, built a report where firms have the chance to look at and be inspired. Kering is computing this source every year, calculating the net profit loss in terms of the environmental impacts of the group. This report is public, and it is available for everyone to encourage other people to be more circular. It is one of the main goals for Gucci to educate others, moving everyone to this transition collaborating.

CS: When do you think Gucci could reach 100% of circularity?

BB: In my own opinion, 100% circularity will not be possible in a luxury firm. It is a big chance that it will destroy its whole business model. They are shifting in many initiatives, but their central core remains to create an excellent quality of products. Regarding Gucci's items, I think that no one will throw away a Gucci bag. However, Gucci could be more sustainable with the logistics, production, and packaging. In general, everything is linked to the development of the product.

CS: Do you have any idea of new coming barriers to create/to move on the circular economy?
BB: If things go in this direction, there will be more concerns about circularity. Future barriers could be everything regarded as traceability. In addition, obstacles are closer to traditions and how Gucci is creating new items. Then, the logistics or location barriers could become a problem if Gucci is selling something far away, and they could have to come back, modify, and sell it back. The cost of transportation is very high. Another one is Gucci’s faced worldwide, having to be with Italian regulation and then German and then French is different. First, because they have additional rules, but also other technologies implemented. This concept is crucial. If they made something fully recyclable in Italy, it might not be the same in Germany or Korea, so they must continuously change the product for every country.
Appendix D) Transcript of Interview w/ Natalie Dionne – CEO at Thalie Paris

Costanza Suriano = CS
Natalie Dionne= ND

Presentation: Natalie Dionne is the founder of the new French brand, Thalie Paris.

CS: Did you and your team find any specific barriers to implementing the business model based on a circular economy?

ND: We have to invest a lot of budget in marketing and communication to reassure our buyers about their investment in our bags.

CS: Was it hard to change the mind and the habits of the employees and change the company's culture?

ND: We are a young corporation, so we did not face this problem. However, we are a young team, and the young generation is concerned by ecological issues in this circular economy.

CS: How is the company measuring the metrics to be circular enough?

ND: We are a young brand, so we don't have a way to evaluate our circular economy. Today, we cannot assess the carbon footprint, but we have provided a questionary to all our suppliers. Our concept is to be eco-responsible on the whole chain. We would like to pre-test our bags via artificial intelligence and then produce only the models that please and that are pre-selected to avoid overproduction and to have in short circuit. In Paris, we can deliver on foot or by metro for the moment. Abroad, we are trying to make grouped shipments, but everything is not yet in place, and we continue to seek to develop on this subject.

CS: What about the barriers to regulations? Did you encounter some that blocked the creation of sustainable products?

ND: No.

CS: Does the start-up have any issues regarded technology or investments?

ND: No.

CS: Did the company find any infrastructure problems about the production locations of materials?

ND: No.

CS: Was it hard to compete with competitors with lower prices?

ND: Yes, it was pretty hard because manufacturing costs in France are high. But, overall, customers are engaging in innovation due to materials. However, it is still difficult to convince them about the value of the materials and then the value of the bags.

CS: Do you have any idea of new barriers to moving on circularity?

ND: Indeed, we have chosen to use new innovative materials. We work with 2 different manufacturers; we may be penalized if one cannot keep up with the demand.
Appendix E) Transcript of Interview w/ Silvia Mazzanti – Sustainability Manager at Save the Duck

Costanza Suriano = CS
Silvia Mazzanti = SM

Presentation: Silvia Mazzanti, Sustainability Manager in Save the Duck, she has been working in the company for the past almost 5 years.

CS: Tell me about the sustainable strategy and the primary keys to the circular economy?

SM: Strategy about Sustainability starts together with the creation of the company. The brand was settled in 2012, but the public company was created in 1914 by the grandfather of the brand's CEO, Save the Duck (Nicholas Bargi). The company name is Forest clothing, made from the entrepreneurial spirit of Foresto Bargi. Nicholas Bargi decided to create Save the Duck with an extra value comparing the other competitive brands on the market. He has an excellent experience because he grew up in a fashion company, so Nicholas knew how the industry is working. He wanted to offer to the market something innovative about ethics. Since the beginning, the brand has been settled on fundamental pillars: love for animals, respect for the environment, and people. His main topic was to guarantee customers without damage in creating garments. First, the sustainability strategy developed has the company has founded, with asking suppliers certificates for fabrics and raw materials. Then the interest in what they wanted to be doing increased, so they decided to more substantial and third parts certifications that could prove that they were working correctly and taking a right directly into the sustainability path. In 2019 Save the Duck received the 'B Corporation' certification, the first company in Italy to get it. After that, the brand continued to grow through the sustainability direction inspired by the certificate. They found out that there were many things to do and to change, they became more active about social and environmental topics. Focusing on the Circular concept, the brand is engaged with Bocconi University (SDA). They are working together with other companies to look for the best KPIs to monitor the Circularity on their value chain. It is a working progress path, and they are starting to develop a pilot project, and they presented September 2021 KPIs to United Nations Economic Commission for Europe (UNECE). Save the Duck needs to transmit it to the European Commission and United Nations. It is crucial because the massive problem in the fashion industry is the laws are not completed, no specific rules in this industry to guide brands.

CS: What about the new hooded jacket 100% sustainable (Recycled Collection), which were the difficulties to reaching that item?

SM: The severe difficulty is about the last part of the product, so the recyclability. More specifically, it is not difficult to create a sustainable item because Save the Duck started to develop products with sustainable materials or at least traits value chain of sustainable raw materials. Moreover, regarded partners, the brand already had valuables with who they collaborated since the foundation. Also, the price issues are not that heavy for the brand because, in the last years, the prices of recycling materials have been decreasing. Therefore, they are more and less equal to the original ones. For this reason, the Manager Silvia means that this is not the main topic, also helped because they are used to use that kind of materials, so their items have been sold with that price range. So, price and cooperation with stakeholders
were not issues, but the real problem is how to recycle the product at the end of life. The circularity tasks and challenges are improving their eco-design and trying to create products as efficiently as possible to be disassembled. That part of the process is not easy for Save the Duck. Besides that, Save the Duck products have a long life, they knew with analysis and researches. They found that many pieces from the first collections are still seen on the streets. They can identify them because they have a logo different from the present one. These analyses say that their products last over ten years since they are still used, especially in Italy. So, it is certified that Save the Duck creates long-life items. Come back, the complex issue for the brand is how to recycle the product at the end of life. It is difficult because they make puffers and have a lot of stitching, which is the fundamental trade-off they have to face. Trying to create beautiful items but also easy to disassemble, and usually Save the duck product has three stitching in one piece. Even if they are trying to leave the product as clean as possible, they know that this mix of stitching will be a challenge, and the more critical problem is that they do not have control of the last faces of the product life. Because it is at the end of the final users, they cannot control who holds the product at the end of his life. They give suggestions to customers to maintain the quality of a product. Still, they also suggest selling/giving as a present/giving for charity if you are tired of your jacket that is still usable and for those damaged pieces and they cannot be longer repeated transform it and give it a second life. The band is very far from the product. They do not know who is the owner of a product. So, the best strategy to overcome this issue is to give these kinds of suggestions educating them to take care and maintain as best as possible. They consider as an intermediate step at this moment.

CS: Was it hard to change the mind and the habits of the employees and change the company's culture?

SM: Save the Duck is very lucky in this sense; it is not an ordinary fashion company. A company in 40, and I think this helped a lot because sustainability and circularity are embedded in the brand's DNA. They did not have to learn how to become sustainable. Differently, they make offers to become more sustainable, but they started with a strong base. This is different from other companies considering this topic now, and they have to change their business model. This is not happened in Save the Duck.

CS: What about the barriers to regulations? Did you encounter some that blocked the creation of sustainable products?

SM: It depends on the markets. For example, it is prohibited to sell pieces to children below one year made with synthetic materials in the Russian market. It is the culture of Russia; it is a specific example. They do not like recycling very much. Russia is the only country that gives them this kind of illegal problem. On the other hand, Germany, USA, and Canada are the three top countries where they sell more sustainable products, but also Italy is much really engaged in circularity.

CS: Does the company have any issues regarded technology or investments?

SM: We faced the problem of technology issues a few years ago when they wanted to create a new collection of padding in nylon. We got a result, but it was not very beautiful, so the project did not affect as they inspected. It is essential to say that it is true that we have to create sustainable items, but it is also true that if you create products that are not interesting and beautiful for the market, they do not sell them, and so they are not sustainable items around.
There was a technical issue, and they do not solve it yet. Since it is a chemical barrier, we try to overcome it with research and new technologies. We decided not to insist but to look for something else, not waste time and money. Learning from mistakes, and we go in another direction.

**CS:** Do you have any idea of new coming barriers to create/ to move on the circular economy?

**SM:** Because of economic interests, they are pushing the opinion that it is all greenwashing. They do not want to change their business model, but in my own opinion, they would not realize it because too many social levels are involved in sustainability now. During the last years, sustainability opinion has changed a lot. Regarding the fashion industry, it is not easy to overcome the competitiveness among fashion brands. Jealousy and the idea of sharing are not very common in the fashion environment. For example, this happened with a luxury brand. The brand doesn’t want to mix and match with fast fashion or lower brands. Some luxury and bigger companies do not like sharing information, technologies, and problems to become more sustainable and not lose the competitive vantage of luxury. Brands are unwilling to corporate even if it is for a good cause. Egoisms dominate the fashion brand.
Appendix F) Transcript of Interview w/ Sebastiani Alice– Sustainability Product Manager at Inditex

Costanza Suriano = CS

Alice Sebastiani = AS

Presentation: Alice Sebastiani, Sustainability Product Manager in Inditex, she has been working in the company for the past almost 3 years.

CS: Tell me about the sustainable strategy and the primary keys to the circular economy?

AS: The strategy has different kinds of objectives between different dates and between different areas. One area is the sustainability in the store, another one in the headquarters and then the one regarding production and many others. For example, this year, they are already working to implement sustainable bags to eliminate all the plastic/paper bags. And they will implement, for instance, in Primark, where you can buy the reusable bags in the stores or bring your own. So, you don’t waste any more paper or plastic bags you use, and then you throw them away. The second object is the join life program, in which they have items in the store that are join-life; this means that they achieve a certain percentage of sustainability in the quality of the garment. For example, if organic cotton is made at least 65% (not certain of the exact rate), it is classified as a join-life product. By the end of 2025, the objective is to reach for all products within the join-life line. So all the items are sustainable in the right way. This is some strategy in the store, then moving on to the one in the production, which means maintaining a good quality of the factory to achieve more sustainable product. For example, using manufacturing that uses less water or maybe energy helps those who cannot have those characteristics. Then the sustainability within the company, in the pillar of the company. This will have a massive impact on the other company because if Inditex can do it, everyone can do it.

CS: Was it hard to change the mind and the habits of the employees and change the company's culture?

AS: They are continuously doing talks about sustainability, so most of the employees can understand the concept. They also do more follow-ups and meetings for designers regarding sustainability because they require a certain % of sustainability of product sustainability, and every year is more and more. So, for example, they set objectives for them, so even designers and buyers have to learn about them and implement them. Probably, they are the section with more information about sustainability targets. Inditex had some problems educating employees, especially when they told suppliers to negotiate prices because sustainable products cost more. During the production journey, many issues arose because not every fabric goes with every style, so it is necessary to adapt to the kind of fabric you are using. On one side, producers need to adjust the sustainable levels that the company asks you to, and at the same time, you want to see a product within a margin of the price that covers the production price cost. It is hard for them to combine the two things; at that point, you have the most significant issue.

CS: How is the company measuring the metrics the sustainable materials, and how circular are they?
AS: I believe that Inditex as a group is very structured to implement sustainability, and of course, it is hard to measure the outcome. Zara is a fast fashion, so it will be tough to be 100% sustainable because it promotes consumption. In general, when you are selling something, you will never be sustainable because you are putting more waste into the world; it is my own opinion. If you want to be sustainable, you resell second-hand products. Otherwise, you will not 100% sustainable. It is hard to measure how much a company is sustainable; they can figure out how much less the product is wasted; for example, if they are tacking the plastic bags, they can measure how less they are polluting. But they will not know how sustainable or circular the product is at the end.

CS: What about the barriers to regulations? Did you encounter some that blocked the creation of sustainable products?

AS: There are global rules about sustainability; any company has a base to respect. Every brand inside Inditex control and monitor this aspect on its own. She is not sure that every brand is doing everything they can to be sustainable because it is hard for any company being circular for anything they do if they are born like that, so a company is based on that. About this topic, Inditex decided to create an internal measurement, joint life. But they mentioned that the company's internal levels agreed that it is nothing internationally. She believes that there are many activities that they are doing to become more circular, but Inditex, in general, they do not promote enough. I suggest educating the clients. The customers that buy Zara are speedy consumers. Inditex has to teach that the products they sell could be reused and that the items are sustainable. Many people see Zara as the super unethical, unsustainable brand that is not, which is not. What about the barriers to regulations? Did you encounter some that blocked the creation of sustainable products?

CS: There is something that do you believe Inditex could do to become more circular?

AS: For me, the key is trying to produce less and make high-quality products and sell them at a high price, which she thinks they are already doing because mixed items are more durable.

CS: Do you have any idea of new coming barriers to create/ to move on circular economy?

AS: It depends on the type of business; money will maintain the huge barrier to achieving that sustainable product. In the future also the suppliers could be a barrier, in addition, she thinks that the prices will increase a lot that only stable company with finding the way to afford and the rest will kind of deal with it or disappear.