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SCHOOL OF ECONOMICS AND BUSINESS

MASTER'S THESIS

**AN ANALYSIS OF SUSTAINABLE PRACTICES IN FASHION
INDUSTRY WITH THE FOCUS ON FAST FASHION BRANDS**

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LIST OF ABBREVIATIONS

°C – degree Celsius
BCI – Better Cotton Initiative
C2C – Cradle to Cradle
China – People’s Republic of China
CITI – corporate information transparency index
CO ₂ – carbon dioxide
CSR – corporate social responsibility
EU – European Union

GBP – Great Britain Pound
GHG – greenhouse gas emissions
IPE – Institute of Public and Environmental Affairs
LDPE – low density polyethylene
NGO – non-governmental organization
PPA – power purchase agreement
RPET – recycled polyethylene tetraphyte
SC – supply chain
SCM – supply chain management
US – United States of America
WOS – Web of Science
ZDHC – zero discharge of hazardous chemicals

INTRODUCTION

It is impossible to imagine the world without textiles. Almost everyone and everywhere comes into contact with them nearly all the time. Clothing does not only provide comfort and protection but is also a way of expressing one's individuality. However, fashion as we know it today certainly has several drawbacks that are becoming increasingly clear. A take-make-dispose model is the existing system on which the processes in clothing value chain are based. Clothes are produced in high volumes and from non-renewable resources. They are often bought to be used only for a short period of time after which they are disposed and end up in landfills or face incineration. The estimations even show that approximately half of the garments produced by fast fashion brands are disposed of in less than a year (Ellen MacArthur Foundation, 2017).

The production is driven by demand which became quantity- instead of quality-oriented. This leads to reducing the costs all along the value chains and the consequences are too often suffered by the most vulnerable (Cho, Gupta & Kim, 2015). In case the demand continues to grow at the current scale, the total global clothing sales could reach 175 million tons in 2050 which is more than three times of today's amount (Ellen MacArthur Foundation, 2017).

However, numerous incidents have put fashion industry under the spotlight. On one hand, there is uncontrolled mass consumption but on the other hand, the demand for more sustainable practices is growing among consumers which accelerated during the Covid-19 pandemic. Despite uncertainty and financial losses the companies have been facing since spring 2020, environmental aspect will urgently have to be addressed in the nearest future (Granskog, Libbi, Magnus & Sawers, 2020). Sustainable business models are transforming from niche to necessity and large fashion brands are urgently seeking new ways to decrease their negative environmental impact (Kozlowski, Searcy & Bardecki, 2015).

The goal of this master thesis is to analyse sustainable practices in fashion industry with the special focus on fast fashion brands which are the biggest polluters in the fashion industry, thus leaving the biggest environmental- and social-negative impact. The findings represent the basis for further research and analysis of the sustainable practices implemented by the biggest fast fashion brands through the whole value chain. The analysis should provide answers to the following core research questions:

1. What are the characteristics of the global fashion industry?
2. What is fast fashion and what are the characteristics of the fast fashion business model?
3. What is the environmental burden of the fashion industry and particularly in fast fashion?

4. What is the role of sustainable business practices in fashion and especially in fast fashion?
5. Which sustainability practices are used in the fashion industry?

The definition of fashion and the relationship between fast fashion and sustainability relies on the bibliometric analysis where the most relevant and the most cited literature regarding sustainable fashion is analysed. The market analysis relies on the use of available secondary data sources as well as relevant literature and industry reports regarding sustainable fashion, thus enabling a comprehensive overview of the current sustainable practices implemented by the biggest and most renowned fashion brands.

When preparing the thesis, I faced several obstacles. The first potential obstacle of doing such research is lack of data and questionable level of transparency of fashion brands on sustainability. Companies often expose the data to the extent that is acceptable by the public and cover up the rest of information which would not be well accepted by the public or would even be punished or penalized. Second, there are only few well described practices with the literature still being narrow in the field. Third, there is a lack of data on the topic.

This thesis is structured into four main chapters. In the first chapter, the definitions of fashion and fast fashion are given as well as exploration of relationship between fast fashion and sustainability. A bibliometric analysis is performed in the second chapter, where the most relevant and the most cited literature regarding sustainable fashion is analysed by using the Web of Science portal as a database. A market analysis is done in the third chapter, which relies on secondary data sources as well as on relevant literature and industry reports regarding sustainable fashion and sustainable practices implemented by fashion brands. This analysis is predominantly based on qualitative research model. The goal of this chapter is to ensure a comprehensive overview of the current sustainable practices in fashion industry. Key findings are then summarized in the fourth chapter.

1 (UN)SUSTAINABLE FASHION

In the first chapter, the current situation in fashion industry is described together with the consequences of unsustainable business operations the fashion giants are performing. The reasons for much-needed changes are outlined. A definition of sustainable fashion follows, which indicates the broadness of the problem the fashion industry is causing.

1.1 Current situation in fashion industry

Until the industrial revolution, limited production and limited division of workforce represented the main constraints of the fashion industry to be available to the masses. The invention of the sewing machine in 1790 brought the first serious changes to the industry –

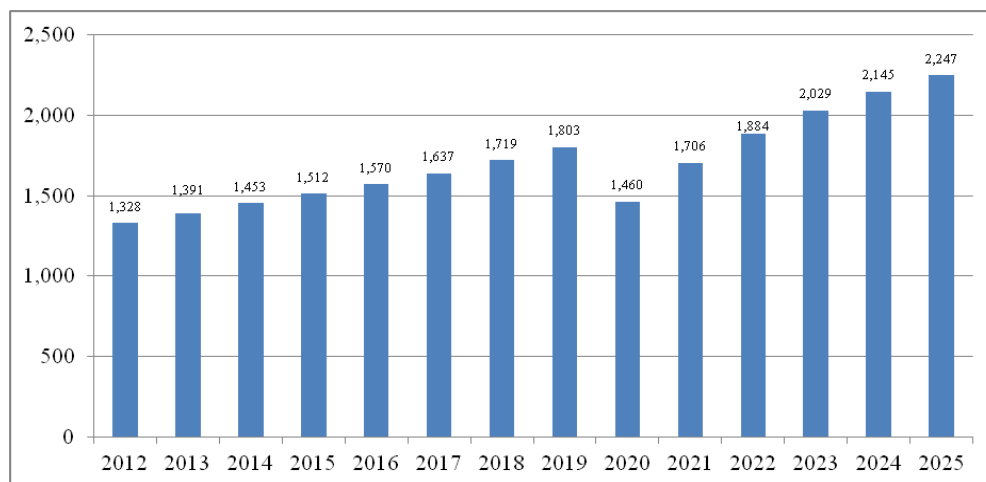
the connection between production and consumption broke down into several new processes. In the early years of industrialization, textile and apparel industry was already among most dominant industries regarding employment, capital access and value added activities. It was the first industry to use modern manufacturing processes (Karaosman, 2016).

Unlike other industries, where several processes among the value chains were automated or modernized, the textile industry still remains a craft-based industry, where manually operated sewing machines still represent a principal means of producing garments. Disruptive fast fashion changed the rules of the game completely. Mass production together with customization is now perfectly feasible and the revolution of the supply chain in the 1990’s has made the fashion industry become global force with constant production and global distribution (Karaosman, 2016).

1.1.1 The value of the fashion apparel market

According to Statista (2021a), the global revenue of the apparel market in 2020 was \$1.46 trillion which was approximately \$340 billion lower than in the year before. An overview of the revenues of the apparel market worldwide in the period from 2012 to 2025 is presented in Figure 1. Despite the significant fall in revenues in 2020, the industry is expected to recover and continue to grow with the previous pace. However, the intense competition among the companies in the industry will remain since there are no switching costs for the consumers and there is a high level of product differentiation.

Figure 1: Revenue of the apparel market worldwide from 2012 to 2025 (in billion US dollars)



Source: Statista (2021a).

In 2019, the United States of America (hereinafter “US”) was the country with by far highest revenue in the apparel market (\$360 billion) with China close behind (Statista,

2021a). It is estimated that China offers one of the biggest opportunities in terms of growth for fashion brands. Over the past decade, China accounted for 38% of global fashion-industry growth with luxury segment predominating. However, one must keep in mind the slowdown in economic growth in China which suggests more challenging conditions in the future. Therefore, new opportunities are arising and they are not far away – in India. India is a great opportunity, especially for price competitive players (Amed, Berg, Hedrich, Poojara & Rölkens, 2020). The revenue of the apparel market in India amounts to \$81 billion which puts the country on the 4th place, just behind Japan (Statista, 2021a). South Asia represents huge growth potential as the average age is 29 comparing to 37 in China. However, the region consists of various markets, cultures, tastes and budget so each specific market segment should be carefully targeted. Last but not least, Middle East must not be forgotten, despite its strong and established mall culture. An average consumer in the United Arab Emirates spends over six times more on fashion than a Chinese consumer and an average Saudi Arabia consumer spends twice as much as a Chinese consumer (Amed et al., 2020).

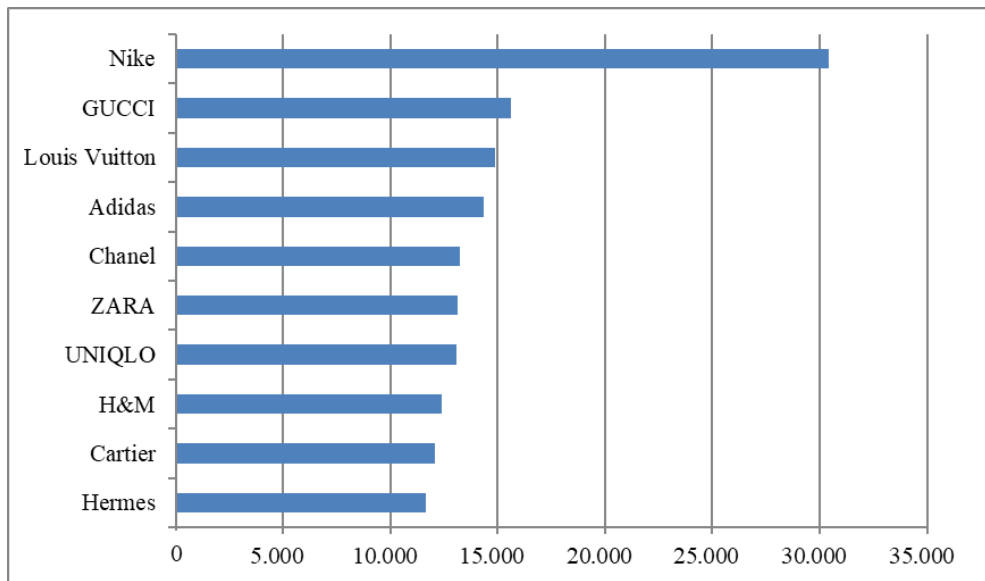
Last but not least, according to Statista (2020a), the two leading exporting countries/regions of apparel by value in 2019 were China (\$151.6 billion) and the European Union (hereinafter “EU”) (\$135.6 billion). On the other hand, the EU is as well by far the largest importer of apparel by value (\$179.5 billion) with the US following on the 2nd place (\$95.5 billion) and Japan on the 3rd place (\$29.8billion).

1.1.2 Largest fashion companies and brands

The largest apparel companies by revenue worldwide in 2019 were VF Corporation, PVH, Hanes, Ralph Lauren, Tapestry, Levi’s, CAPRI, Burberry, Hugo Boss etc. The largest company VF Corporation (includes a large brand portfolio which consists of the brands such as Supreme, Terra, The North Face, Timberland etc.) had the revenues in the amount of \$11.7 billion in 2019 (Statista, 2021b).

Figure 2 presents the value of the leading 10 apparel brands worldwide in 2021. Nike was the top apparel brand with the revenue in the amount of \$30.43 billion. Other leading apparel brands are Gucci, Louis Vuitton, Adidas, Chanel, Zara, Uniqlo, H&M, Cartier and Hermes.

Figure 2: Value of the leading 10 apparel brands worldwide in 2021 (in million US dollars)



Source: Statista (2021c).

The global apparel industry continues to grow at a healthy rate despite the global economic downturn due to the pandemic (Statista, 2021c). However, it is important to distinguish that even well-established brands such as Nike have to work very hard to maintain their position in the market. Consumers are demanding more every year, for example more versatile wear with more functionality. Brands must keep continuing to produce new styles to satisfy the needs of the consumers (Statista, 2021b).

1.1.3 Consumer spending on clothes and footwear

Consumer spending on clothing and footwear is expected to continue growing in the future as well. There was a significant decrease in consumer spending in 2020 due to Covid-19 pandemic. Consumer spending on clothing and footwear in the world amounted to \$1,967 trillion in 2020 but it amounts to an estimated \$2,204 trillion in 2021. The forecasted value of consumer spending on clothing and footwear amounts to \$2,781 trillion by 2025. China was ranked 1st by total consumer spending on clothing and footwear in 2020, with the US following, and with Germany, the United Kingdom (hereinafter “UK”) and India on the 3rd, 4th and 5th place. Per capita consumer spending on clothing and footwear by country ranking is a little bit different. Here, Luxembourg has by far the highest consumer spending per capita with Switzerland, Norway and Canada following. Denmark, Austria, Belgium, the UK and the Netherlands follow with approximately the same value in per capita consumer spending (Statista, 2021b).

However, it is important not to rely on historical data too much in these Covid-19 pandemic or post-pandemic times as consumer behaviour has changed considerably. Many

people have changed their perspective and reprioritized as a result of pandemic. For instance, one of the results of pandemic is that people started to look for the brands whose actions align with their beliefs and values. More specifically, 80% of consumers prefer buying from brands which are acting in accordance to their beliefs and values. Sustainable products and services were given greater perceived value during the pandemic as 37% of consumers now prioritize such products and services. Moreover, people understand the importance of supporting brands and retailers that are ethical and try to give something good back to society – more specifically, 90% of consumers are willing to pay more in order to support such brands. Currently, consumers are also more concerned about the future economic outlook – 46% are worried about recession to a great extent so they (49% of consumers) tend to focus more on saving rather than spending (KPMG International Global Customer Insights, 2021).

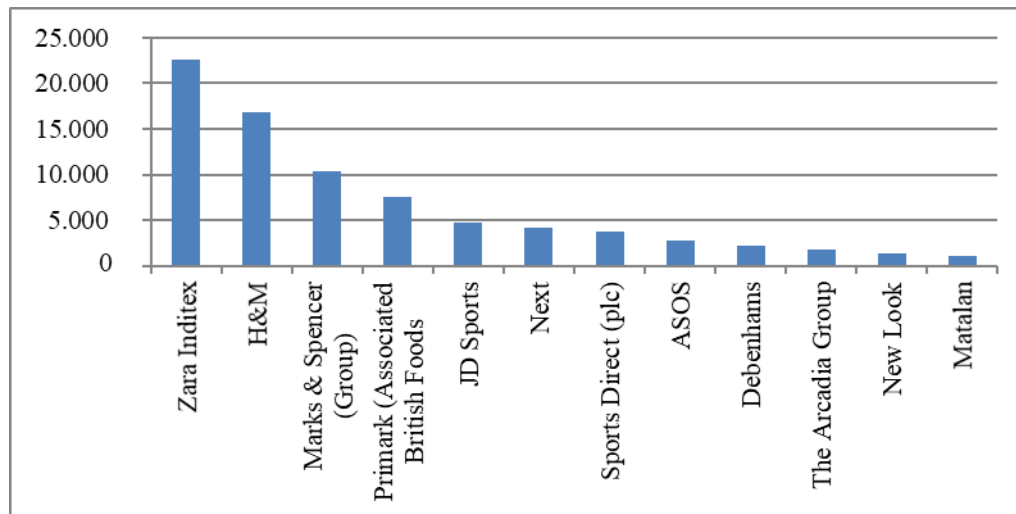
1.2 Fast fashion market

Fast fashion is a subset of “ordinary” fashion which can be defined with mass production of cheap and disposable clothing together with countless new collections per year (Charpail, 2017). The volume of clothes produced and consumed is increasing - the volume of clothing production doubled from 2000 to 2014. A throw-away mentality has developed and the attitude towards clothes has changed. Clothes used to be cared for, shared and repaired in the past but now shopping and quick disposal is the new pattern. Marketing, pricing and advertising strategies are being developed toward triggering consumers’ shopping impulses. Fast fashion business models are based on lowering the prices of garments to a certain threshold where buying on impulse becomes low-risk. Primark, for instance, sets the prices so low that they are unable to sell clothes online as the shipping costs exceed the value of the product itself (Wahnbaeck & Rolof, 2017).

Fast fashion companies often source and manufacture in developing countries. They have extensive supply chains which are hard to track. Their business models are based on overproduction which causes huge waste problems as unsold items often end up in landfills or are discarded improperly. Thus, fast fashion companies are often the target of criticism mainly for ethical and environmental issues (Statista, 2021c).

Figure 3 presents the leading European fast fashion brands based on total revenue worldwide in 2019. A Spain-based retailer Zara, which is a part of the Spanish Inditex group, was ranked as the leading European fast fashion brand in 2019. Its annual revenues in that year surpassed the annual revenues of Marks&Spencer and Primark combined.

Figure 3: Leading European fast fashion brands based on total revenue worldwide in 2019 (in million GBP)



Source: Statista (2021c).

According to Statista (2020), the fast fashion market value is expected to continue growing, however with a slower pace as in the past. The global market value in 2009 was \$22 billion, in 2019 it was \$36 billion and it is expected to amount to \$43 billion in 2029.

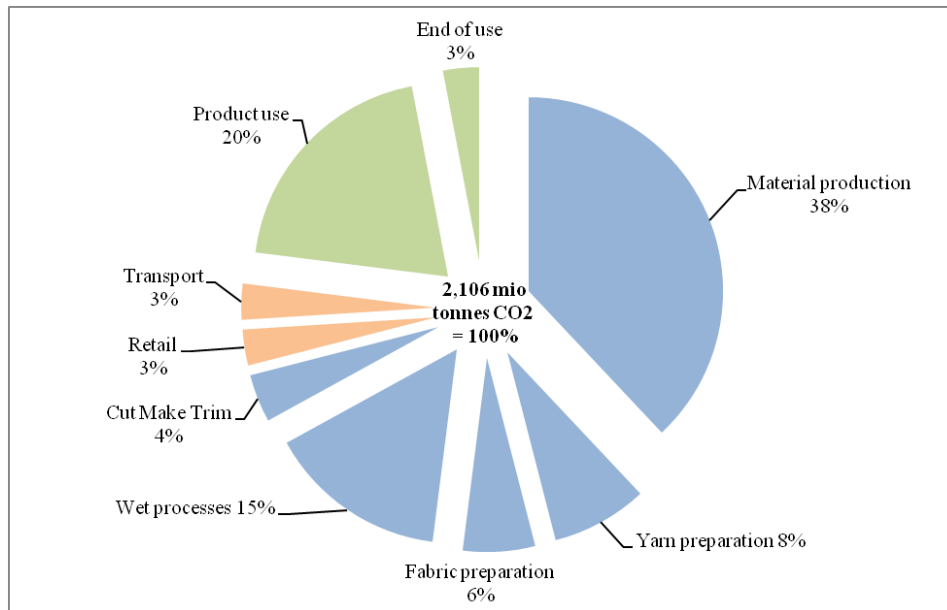
1.3 Environmental burden of fashion industry

Despite great success in terms of overall constant global progress and development of the fashion industry, the negative consequences followed in the shape of environmental- and social- negative externalities. Fletcher (as cited in Bly, Gwozdz & Reisch, 2015) outlined environmental degradation, toxic chemicals, poor working conditions in terms of child labour, low wages, and destructive working environments as few main downsides of a successful fashion story. The level of greenhouse gas emissions (hereinafter “GHG emissions”) has accelerated significantly and has contributed to atmospheric warming. The global temperatures have risen by approximately 1.1 degree with significant deviations across different regions. Devastating floods, fires, droughts and storms are now occurring more frequently than ever, leaving a negative social and economic impact (for example destroyed homes, inability to work, interrupted food supply and destroyed natural capital) on the affected areas. With the continued upward trajectory of the temperatures, the future natural disasters are inevitable (Berg, Granskog, Lee & Magnus, 2020).

According to McKinsey&Company the global fashion industry produced 2.1 billion tons of GHG emissions in 2018 which represents 4% of the total global GHG emissions. For example, the number is equivalent to the annual GHG emissions of France, Germany and the United Kingdom combined (Berg et al., 2020).

Figure 4 presents an overview of apparel and footwear value chain GHG emissions in 2018. It is clearly visible that more than two thirds (blue colour) of emissions come from upstream activities such as raw material production, preparation and processing. Less than a third comes from usage and end-of-use processes (green colour), and only 6% of GHG emissions come from brand operations such as retail and transport.

Figure 4: Apparel and footwear value chain GHG emissions in 2018 (in %)



Source: Berg et al. (2020).

A take-make-dispose model is a current system on which the processes in clothing value chain are based. Clothes are produced in high volumes and from non-renewable resources. They are often bought to be used only for a short period of time after which they are disposed of and end up in landfills or face incineration (Ellen MacArthur Foundation, 2017). It seems like the current fashion system is based on planned obsolescence which became even worse with the fast fashion business model. Fast fashion brands deliberately produce cheap and throwaway garments which are produced at low cost. This enables them to produce multiple collections per season instead of traditional two collections per year (Birtwistle & Moore, 2007). The estimations show that more than half of the garments produced by fast fashion brands are disposed of in less than a year. Such system puts great pressure on resources, degrades ecosystems due to high levels of pollution and leaves significant societal impacts at local, regional and global scale (Ellen MacArthur Foundation, 2017).

The production is driven by demand which continues to grow quickly. It is especially driven by emerging markets in Asia and South America (Ellen MacArthur Foundation, 2017). Demand became quantity-oriented instead of quality-oriented. When consumption is based on quantity, the price that consumer is willing to pay for one piece of clothing is

reduced, which leads apparel companies searching for suppliers that can deliver products at lower costs, and this often leads to a decrease of compliance with ethical standards (Cho et al., 2015). In case the demand continues to grow at the current scale, the total global clothing sales could reach 175 million tons in 2050, which is more than three times of today's amount (Ellen MacArthur Foundation, 2017). What is more, if no further actions are taken over the next few years, the fashion industry's GHG emissions will rise to around 2.7 billion tons a year by 2030, which is an annual growth rate of 2.7% (Berg et al., 2020). The negative societal and environmental impacts will be further magnified and it would put the industry's reputation and profitability at risk. It is impossible to expect no further growth of the industry, especially due to the shift of population and consumption patterns (Ellen MacArthur Foundation, 2017).

It is not only the negative consequences of the unsustainable production processes, it is also the management of textile waste that represents a huge problem. If the scale and the way of production remains the same, it is expected that more than 150 million tons of clothing would be landfilled or incinerated in 2050. The weight of the clothes accumulated between 2015 and 2050 would amount to more than ten times that of today's world population. What is more, in case the industry continues its current path, 25% of the carbon budget for a 2-degree-Celsius (hereinafter "°C") pathway would be used for the textile production. It is crucial that the target of 2°C is kept within reach; otherwise, the goal will soon become unattainable (Ellen MacArthur Foundation, 2017).

Several incidents together with critical numbers mentioned above have put the fashion industry in the spotlight. The awareness of the industry's negative impact on the environment and on people's lives has been generating by the wider public, non-governmental organizations (hereinafter "NGOs") and governments (Ellen MacArthur Foundation, 2017).

1.4 Sustainable fashion as a response

There is no single way to define the term "sustainable fashion". Predominantly, the term is associated with environmental sustainability, more specifically in relation to the use of renewable and eco-friendly raw materials, the reduction of carbon footprint, durability and longevity. Furthermore, sustainable fashion includes social aspects as well, such as fair wages, safe working conditions and respect of human rights. The use of locally sourced raw materials, reclaiming, recycling and upcycling processes, transparency across the supply chain and traceability of work processes are just some of the subsets of sustainable fashion which will be covered in the following chapters (Henninger, Alevizou & Oates, 2016).

Despite the fact that sustainable fashion is not a new term, consumers are still unsure what sustainability actually means or how to identify sustainable brands (see Figures 1, 2 and 3 for the general overview of the fashion market) (McKinsey, 2020). Fletcher (as cited in Bly

et al., 2015) added that term can be connected to non-production or non-consumption processes as well. For instance, some consumers perceive sustainability in fashion as purchasing garments that can be worn for a longer period of time (i.e. not disposing the piece after wearing it only for a few times). This is also supported by the statements of sustainable fashion consumption pioneers who participated in the exploratory study held by Bly et al. (2015): they perceive sustainable fashion consumption as buying less but of higher quality, for example rather from artisanal or small producers and not from mass retailers on the high street. Some also try to extend the lifespan of their clothes by repairing or re-fashioning them in the name of sustainability (Connell, 2011), or purchasing only second-hand garments and thus exiting the fashion system completely (Bly et al., 2015).

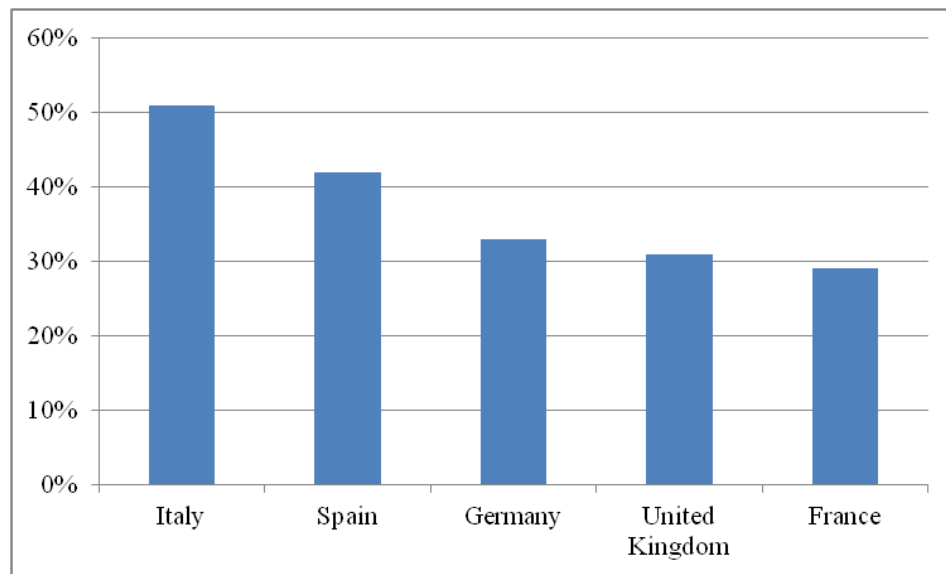
Regarding second-hand clothing shopping, important shortcomings were highlighted by Iran & Schrader (2017). Clothes at second-hand stores are usually cheaper than new clothes in stores. In case clothing shopping at second-hand stores only complements the usual purchasing at stores, the amount of purchased garments by the consumer increases and therefore broadens the problem. Collaborative fashion consumption can be efficient only in case it substitutes the purchase of new clothes. If not, it might even accelerate the trend of increased buying as consumers could get a feeling that their purchase of new clothes can be compensated by passing old or unwanted clothes to peers.

Despite some confusion in terms of understanding the notion of sustainable fashion, the awareness has been growing rapidly in the past few years. According to McKinsey, the number of internet searches for the term “sustainable fashion” increased for as much as 200% from 2016 to 2019 (Ahmed, Berg, Hedrich, Poojara & Rölkens, 2020). Many different factors affect the increased interest in sustainable fashion but according to Todeschini, Cortimiglia, Callegaro-de-Menezes & Ghezzi (2017) there are five socioeconomic and cultural macro-trends that drive business models towards sustainability and innovation. These are: corporate social responsibility, sharing economy and collaborative consumption, consumer awareness, technological innovation and circular economy. In the recent year, Covid-19 has been just an extra push for the industry to accelerate their development of more sustainable business models.

A demand for more sustainable practices in the fashion industry is growing among consumers as well. A survey which was conducted in April 2020 and which included more than 2,000 UK and German consumers showed that respondents want fashion brands to act with higher level of responsibility and to address the negative-social as well as environmental impacts of their actions when doing the business (Granskog et al., 2020).

Moreover, Figure 5 presents the share of EU consumers who considered the environmental impact in the process of clothing shopping as of 2018 (by country). 52% of Italian, 40% of Spanish, 32% of German, 32% respondents from the UK and 31% of French respondents consider the environmental impact of clothes when shopping.

Figure 5: Share of EU consumers by country who considered the environmental impact of clothes shopping in 2018 (in %)



Source: Statista (2021b).

In addition, 66% of Italian respondents of another survey agreed that the law should encourage or even force clothing manufacturers to adhere to ethical principles in the clothing production process. 25% of respondents agreed partly (Statista, 2021b).

Hence, it is very important for the companies to meet new needs and the changed demand of consumers, which goes hand in hand with preserving the environment. Many global fashion brands have taken the action and are making efforts to offer more sustainable options for consumers. Zara, for example, has set the goal to use 100% sustainable fabrics by 2025, while H&M committed earlier to using 100% recycled or sustainable materials by 2030. Moreover, Adidas has committed to phase out virgin polyester by 2024 but has also made several vegan and recycled collections for instance (McKinsey, 2020). There is a certain level of doubt when such fashion giants whose business models are based on speed and mass consumption commit to sustainability. Sustainable fashion is about slowness, being careful and being socially responsible, which is the complete opposite to the fast fashion business model (Bly et al., 2015).

The scale of climate crisis caused involvement of governments and the EU as well. In the beginning of 2021, the European Commission published the initiative “EU strategy for textiles”. The strategy should help the EU shift to climate-neutral and circular economy of which the goal is to design and produce products that can in the first place be more durable, can either be repaired, reused or recycled at the end of the life-cycle and can be generally more energy-efficient. With the strategy the Commission also aims to address the recovery of the fashion industry in the EU due to Covid-19 impact (European Commission, 2021). Some EU Member States have taken individual steps. France, for instance, a global

leader in luxury fashion, introduced a ban on the destruction of unsold fashion goods (to be implemented by 2023) and made donations, reuse or recycling of unsold garments obligatory. It was the first move of such kind in the world made on the national level. Moreover, in 2019, the German government introduced the Green Button – the world’s first government sustainable label (McKinsey, 2020). The role and support of the EU and the governments is crucial for accelerated development of sustainable practices in fashion industry. Some even suggest that “*unethical and polluting processes are what should be taxed, while ethical production should be financially incentivized*” (Pedersen & Andersen, 2015).

2 THE CONCEPT OF SUSTAINABLE FASHION IN THE LITERATURE

Despite the fact that fashion industry is the subject of countless controversies and debates regarding its environmental and social impacts, the literature still fails to offer a comprehensive overview of the reasons that lead to today’s situation. The goal of this chapter is not to analyse and discuss the reasons why fashion industry is currently at a crossroads, but to go one step further and hold a systematic review of literature regarding sustainable fashion and sustainable practices in fashion industry. Based on key findings, a further analysis of sustainable practices implemented by the biggest fast fashion brands will be performed in the following chapters.

In order to objectively review the relevant literature regarding sustainable fashion, I used the Web of Science (hereinafter “WOS”) portal which enables access to a wide range of multidisciplinary bibliographic databases. The WOS consists of databases of cited sources, including data on articles from more than 12,000 scientific journals for the period from 1900 onwards (Mrežnik, n.d.). The WOS was therefore used to perform a bibliometric method.

2.1 Bibliometric analysis of the literature: literature selection process

I started with typing the search term “sustainable fashion” into WOS search engine and I chose to search for the relevant “topics”. Figure 6 shows first steps.

Figure 6: First search step in WOS in the literature selection process



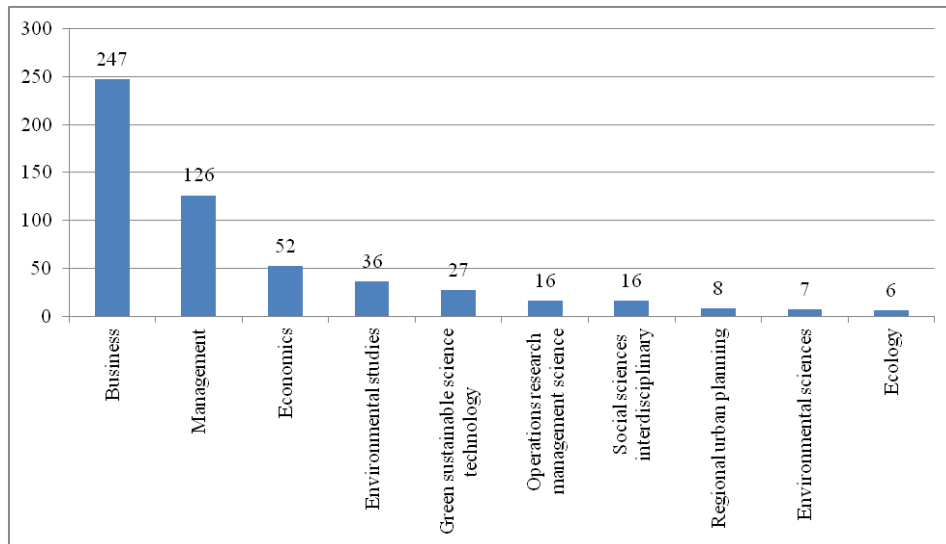
The image shows a search interface with a text input field containing "sustainable fashion", a dropdown menu labeled "Topic", and a blue "Search" button.

Source: WOS (2021).

Furthermore, I selected the search categories “Business”, “Management” and “Economics” as they are most relevant among the ones listed for the purpose of this master thesis. No

other criteria were selected. 320 records were the result of the first criteria applied. On 1 May 2021, most records fell within the “Business” category (247) with “Management” category following with 126 records. The “Economics” category had 52 records. Figure 7 presents ten categories with most records.

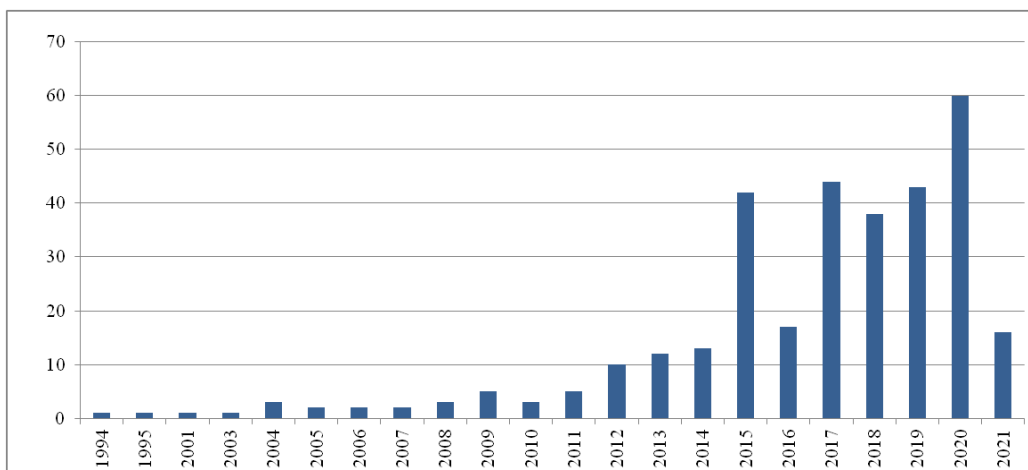
Figure 7: Top ten categories with the highest number of records in WOS on 1 May 2021



Source: WOS (2021).

Figure 8 presents the number of publications regarding sustainable fashion in each year in the period between 1994 and until today in the databases covered by the WOS. This means that the term “sustainable fashion” was first used in a scientific publication in 1994, covered by the WOS portal. The use of the term has significantly increased from the year 2012 on which corresponds to the increasing importance of environmental issues caused by fashion.

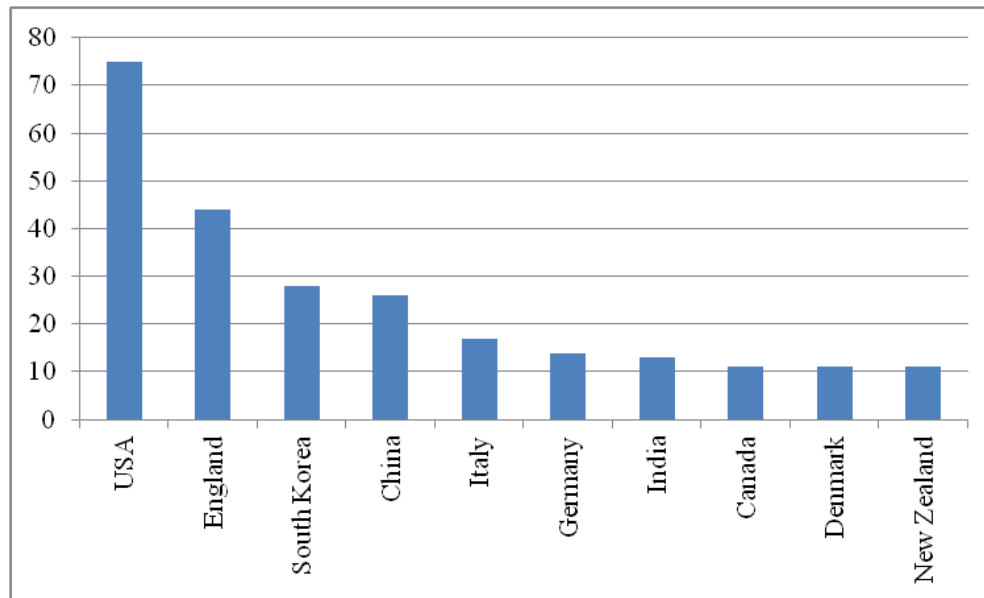
Figure 8: Number of publications on sustainable fashion per year available in the WOS



Source: WOS (2021).

Another interesting category to look at is the country of publication. A visual presentation of top 10 countries is done in Figure 9.

Figure 9: Number of publications on sustainable fashion per country in the selected period available in the WOS



Source: WOS (2021).

The country with by far the highest number of publications on sustainable fashion is the US, which is to be expected as the number of researchers there is by far the largest. The number of publications in the selected period is almost two times higher than in the UK, the country on the second place by the number of publications. South Korea and the People’s Republic of China (hereinafter “China”) follow with 27 and 26 publications respectively in the selected period.

2.2 Review of literature obtained from the WOS

In this chapter, the most cited literature on sustainable fashion is reviewed. The publications were filtered as follows:

- Topic: sustainable fashion,
- Category: business, management and economics,
- Publication years: 2015 – 2021 (in order to actually obtain the most recent literature),
- Application of “times cited” filter (highest to lowest).

Having applied all search steps, the most cited literature published in the last 6 years was reviewed manually. Based on the content of the literature, 3 groups of most frequently covered and most relevant topics were formed. These are:

- Consumer behaviour and attitudes about sustainable fashion consumption,
- Sustainable business models in fashion,
- Sustainable fashion apparel supply chains.

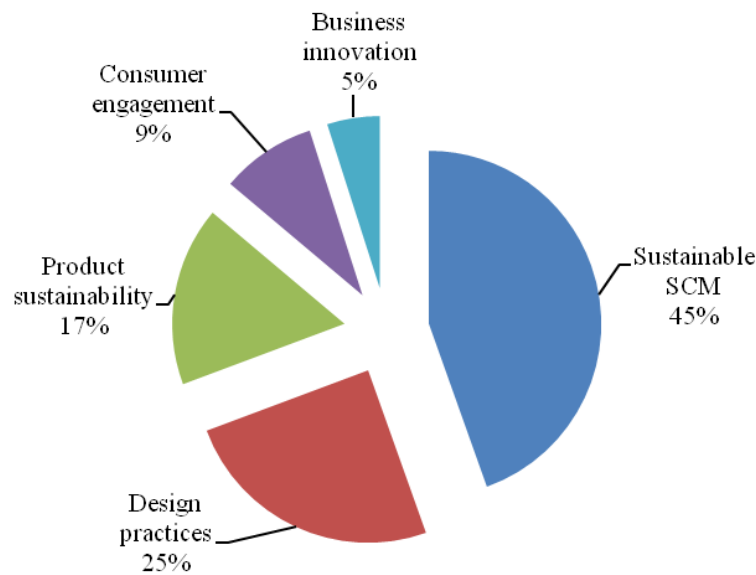
These areas represent the foundation of this master thesis. A review of the most cited literature in the mentioned areas will be made in the following subchapters.

2.2.1 Sustainable business model

Many authors have written about a sustainable business model (Todeschini, Cortimiglia, Callegaro-de-Menezes & Ghezzi, 2017; Pedersen & Andersen, 2015; Kozłowski, Searcy & Bardecki, 2015; Roome & Louche, 2016). The most cited among them were Roome & Louche, 2016; Todeschini et al., 2017 and Kozłowski et al., 2015.

As sustainability issues in apparel industry are becoming of growing importance, large fashion brands are seeking new ways to decrease their negative environmental impact. If sustainability once used to be a niche, it is now certainly a necessity in any fashion business model. An analysis was conducted by *Kozłowski et al. (2015)* in order to obtain all sustainability indicators which have been published and made accessible by 14 major apparel brands in the world, such as H&M, Gap Inc., Nike, Adidas, Puma, Patagonia etc. A review of different kind of literature and sources, such as annual and sustainability reports, brands' blog posts, different kind of interactive media, news and product information, all accessible on brands' web sites, was performed to determine the reported indicators in corporate sustainability reports of the mentioned brands. 87 sustainability indicators were identified as a result, and approximately half of the sustainability information reported by the selected brands was related to sustainable supply chain management (hereinafter "SCM"). Figure 10 shows the frequency of the rest of the indicators disclosed by the above-mentioned companies.

Figure 10: Sustainability indicators disclosed by 14 major apparel brands in their sustainability reports and other reports



Source: Kozłowski et al. (2015).

Besides sustainable SCM, design practices, product sustainability, consumer engagement and business innovations are the top five indicators of sustainability according to the selected apparel brands. Todeschini et al. (2017) went further to discover 15 drivers of business model innovations related to sustainability: 8 drivers were uncovered based on literature overview, while empirical research uncovered 7 more. The drivers were additionally analysed according to how they usually impact the components of a business model according to the definition of the business model canvas, which includes value proposition, customer segment, delivery channels, customer relationship, key activities, key resources, value network, cost structure, and revenue streams.

The overview of results is given in Table 1. In this chapter, each driver is briefly described and supported by different literature sources.

Table 1: Trends and drivers of sustainability-related business model innovation for fashion businesses

Macro-trend	Driver of sustainable innovation	Where does it drive innovation in the business model?
Circular economy	Recycling	Cost structure, key activities, key partners
	Vegan	Key partners, key resources, channels, value proposition
	Upcycling	Key resources, key activities, value proposition
Corporate social responsibility	Sweatshop free	Customer relationship, key resources, key activities
	Fair trade	Customer relationship, key partners
	Locally sourced	Customer relationship, value proposition, key partners
Sharing economy and collaborative consumption	Fashion library	Customer relationship, value proposition, revenue streams
	Second hand	Value proposition, channels, customer relationship, key activities, revenue streams
	Collaboration	Key partners, key activities, key resources, delivery channels, customer relationship
Technological innovation	Sustainable raw materials	Key resources, customer relationship, cost structure
	Zero waste	Key resources, key activities, cost structure
	Wearables	Key resources, key activities, key partners, value proposition, cost structure
Consumer awareness	Capsule wardrobe	Customer relationship, value proposition, revenue streams
	Lowsumerism	Customer relationship, value proposition, revenue streams
	Slow fashion	Value proposition, customer relationship

Source: Todeschini et al. (2017).

2.2.1.1 Circular economy

The main idea of circular economy is purposeful restoration and regeneration. Pursuing a circular economy naturally encourages innovation in the design process of a product or service or even of a new business model (Todeschini et al., 2017). Among the drivers of the circular economy is upcycling. It refers to the waste materials which are the result of apparel production. Upcycled products can be made from pre-consumer (cuts and leftover-fabrics) and post-consumer waste (clothes that are thrown out) (Pedersen & Andersen, 2015). The materials that would normally end up as waste become new products of equal or higher perceived quality, thus extending materials' lifespan and decreasing the need for using virgin (raw) materials (Todeschini et al., 2017).

Another driver is recycling. It refers to converting materials of existing products to create new products. In theory, recycling should be the last alternative of the 3Rs (reduce, reuse, recycle) as it is often least energy-efficient. An example of an innovative business model which relies on recycling is that of Adidas. The multinational brand partnered up with Parley for the Oceans with whom they developed a new business model where plastic waste recovered from the oceans is used as a raw material for new sneakers. Recycling directly impacts cost structure, key activities and key partners (Todeschini et al., 2017).

Vegan is the third driver of the circular economy. It refers to the approach where no raw materials of animal origin are used in the product creation process, thus making a reduction in overall energy consumption as materials of animal origin tend to be the most energy-intensive (Todeschini et al., 2017).

2.2.1.2 Corporate social responsibility

Corporate social responsibility (hereinafter »CSR«) includes different types of practices at different levels, but in fashion it often refers to supply chain management as especially the leading fashion brands have to manage complex networks across the globe (Todeschini et al., 2017). Many authors tried to define CSR but what is common to all definitions is concern about the external environment of the company, sustainable value creation, leaving minimal negative impact on future generations and long-term orientation (Lueg, Pedersen & Clemmensen, 2015).

The concept »sweatshop free« is the first driver of CSR and it involves transparency about working conditions in the manufacturing process. It emerged due to working conditions in low-wage-labour countries where global fashion brands usually locate their production (Todeschini et al., 2017). The textile industry was under scrutiny especially in the 1990s for child labour and other issues. As a reactive tactic, many fashion brands decided to revise their business models and thus improve their image. Such company is, for example, the sportswear giant Nike. The company was not born sustainable but it changed its business model due to public pressure (Lueg et al., 2015).

The second driver of CSR is fair trade which can be defined by fair wages for all workers involved, healthy and safe workplace environments and contributions to the well-being of affected communities. Still, companies with extensive supply chains find it hard to control and guarantee corporate sustainability across the whole supply chain. The complexity together with cultural differences, especially in low-wage-labour countries, result in difficulties to control compliance with the initial code of conduct of the company (Lueg et al., 2015).

»Locally sourced« is the third driver and it refers to locating the product manufacturing process in regions that are geographically close to its consumption, thus reducing transportation costs and reducing environmental impact while stimulating local businesses

and employment as well (Todeschini et al., 2017). Moreover, companies find it easier to direct their partners who are geographically closer to them or are even local players and give them the know-how on the minimum acceptable conditions in order to ensure sustainable production (Lueg et al., 2015).

2.2.1.3 Sharing economy and collaborative consumption

In terms of consumption, sharing economy phenomena is a global, cultural and economic example of the shift from fully owning to only accessing a good or a service when needed. Collaborative consumption is a conscious and efficient alternative for meeting the needs of a larger group of people (Todeschini et al., 2017). Collaborative consumption refers to swapping, leasing, repairing, hiring, reusing etc. and is a direct transformation from products to services (Pedersen & Andersen, 2015).

Collaboration is a crucial aspect of sustainable practices as it enables and allows creation of a supporting ecosystem where resources and more importantly knowledge are shared. It allows business model experimentation and is a key driver for new innovative start-ups and small businesses (Todeschini et al., 2017). Moreover, collaborative projects often include vulnerable groups, such as immigrants, disabled or HIV patients, thus making the projects inclusive. Several companies have developed special collections in collaboration with NGOs, local communities, local artisans or universities/design schools, thus for instance contributing to local economic development or an enhanced learning experience (Pedersen & Andersen, 2015).

Second hand purchasing (promotes reuse and reduction of demand which is far less energy consuming than recycling) and fashion library are another drivers of the sharing economy (Todeschini et al., 2017). A study revealed that second-hand luxury possessions may hold even deeper meanings and connection with their new owners as the owners of second-hand possessions play a more active role when acquiring these fashion pieces (Turunen & Leipamaa-Leskinen, 2015).

The fashion library driver is the same as an ordinary book library, with the difference that apparel is borrowed for a subscription instead of books. The customer can access and use the clothes for a limited time. Normally, such items would be only used several times and then thrown away, while with this business model they reach a wider audience and thus the demand for the new apparel decreases. It is a service-centred rather than a product-centred model. The revenue mechanism also changes from a single-transaction to usage-based or subscription fees. It impacts customer relationship, value proposition and revenue streams (Todeschini et al., 2017).

2.2.1.4 Technological innovation

Technological innovation enables improved sustainability in fashion as well. According to Fletcher (in Iran & Schrader, 2017), improved technology has been recognized as one of the main strategies toward sustainable fashion in the production phase (beside organic material use, improved manufacturing, improved working conditions and introduction of eco-designs).

The most prominent innovation in fashion seems to be sustainable or alternative fibres. One such example is the Italian startup Orange Fiber, which creates sustainable fibres by using waste from orange juice production, or a Brazilian startup which creates high-end fashion accessories by using wood waste for luxury furniture industry. Such examples potentially lead to a zero-waste business model which also includes innovative approaches and technologies to reduce the amount of raw materials used through development and adoption of new and more efficient production processes. Improved apparel durability, reduced amount of waste from cleaning processes and the use of alternative (synthetic) raw materials instead of scarce natural ones are some of the other existing innovation trends. 3D printing also found its place in fashion (Todeschini et al., 2017). New technologies that reduce the social and environmental footprint are being developed and used as tools in order to promote transparency and traceability in supply chains (Pedersen & Andersen, 2015). Technological innovation in fashion enables re-thinking of the existing garment materials and manufacturing processes and leads to redefined business models that go beyond economies of scale and scope of advantages which are generated by fast fashion. In this way, not only the economic but also the social and the environmental value is created (Todeschini et al., 2017). The main drivers of technological innovation identified by Todeschini et al. (2017) are sustainable raw materials, zero waste and wearable technology.

On the other hand, technological innovation in fashion does not only address the production process phase, which seems the most obvious, but it can also include the innovative use of technology for more sustainable shopping practices, such as sharing, bartering, lending, trading, renting, gifting, and swapping. Companies in other industries, such as Airbnb, Spotify or car-sharing companies, are already reaping the benefits of the collaborative consumption concept. They all indicate how the internet enables people to find what they need anywhere and everywhere (Iran & Schrader, 2017). In the end, using innovative technology in fashion could present one of the most efficient sustainable practices as no virgin materials are grown, processed and used, and consequently incomparably less energy is consumed.

Hirschl et al. (in Iran & Schrader, 2017) further elaborate potential efficiency gains of B2C renting and leasing scheme. Utilization of renting and leasing channels could result in the increased use of professional garment care (i.e. washing, ironing etc.), either by the provider or by the consumer, which creates a chance of using significantly less energy,

water and detergents in comparison to private washing. Additionally, the product lifetime could potentially be extended as the materials, colours and functionality are preserved due to professional care.

2.2.1.5 Consumer awareness

Beside the fashion brands recognizing sustainability as a major issue, consumer awareness is of immense importance in the process of effective problem solving. Most fashion consumers still have limited knowledge about sustainable steps that should be taken in order to decrease the negative impact of the fashion industry as well as of their purchasing behaviour (Kong, Ko, Chae & Mattila, 2016). Scant information and lack of transparency make it difficult for the consumers to find better/more sustainable alternatives easily. A lot of effort is needed to find fashion brands that are truly sustainable and fully transparent (Pedersen & Andersen, 2015).

Capsule wardrobe and lowsumerism, which depend greatly on consumers' behaviour and attitude, are one type of drivers of consumer awareness. Such consumers commit to owning only a limited number of clothing pieces for a fixed period of time. Acquisition of goods is conscious and moderate, thus fostering a minimalist approach (Todeschini et al., 2017). It is the complete opposite of the current superficial, irresponsible, unsustainable and unethical production as well as overconsumption and throwaway culture (Pedersen & Andersen, 2015).

Slow fashion is the complete opposite of compulsive fast fashion consumption (Todeschini et al., 2017) where the industry produces and consumers consume in excess (Pedersen & Andersen, 2015). It refers to production and commercialization practices. Slow fashion brands tend to target consumers with better perceived quality and authenticity as well as with addressing customer concerns regarding environmental and social impacts (Todeschini et al., 2017).

2.2.1.6 Difficulties in changing the business model

With all things considered, it is very difficult for big global brands to switch from the predominant manufacturing and consumption patterns as they have proven to be successful and profitable. For these companies, a change of business model might be met with reluctance as it would represent a major shift from fast production of quick commodity goods to so-called slow fashion or sustainable fashion (Pedersen & Andersen, 2015). Moreover, it is difficult to even distinguish between the companies that actually implement and practice CSR and between the companies that only disclose the data and show the image that is desired by the public (Lueg et al., 2015).

On the other hand, fashion startups start from a different position. They are usually born sustainable as they leverage their flexible state. Therefore, they can easily practice and promote social and environmental sustainability which are at the same time their key values and motivation of existence. Such startups find it easier to embed sustainable trends in comparison to incumbents whose business models are far more rigid and have a deep-rooted system. These are one of the reasons why big companies tend to act with a certain level of caution and try to experiment with green initiatives on smaller scale. Also, they usually address only a limited number of issues, such as transparency in supplier selection for example (Todeschini et al., 2017).

Experts agree that in order to foster change of the business model, a top-down implementation is needed for the change to happen. A management commitment is one of the most crucial factors for a successful implementation process as it is the top management who sets the direction and allocates resources to different priorities. Additionally, the change must be supported by the rest of the staff/employees as they co-create and co-design the process of change (Pedersen & Andersen, 2015).

2.2.2 Sustainable fashion apparel supply chain

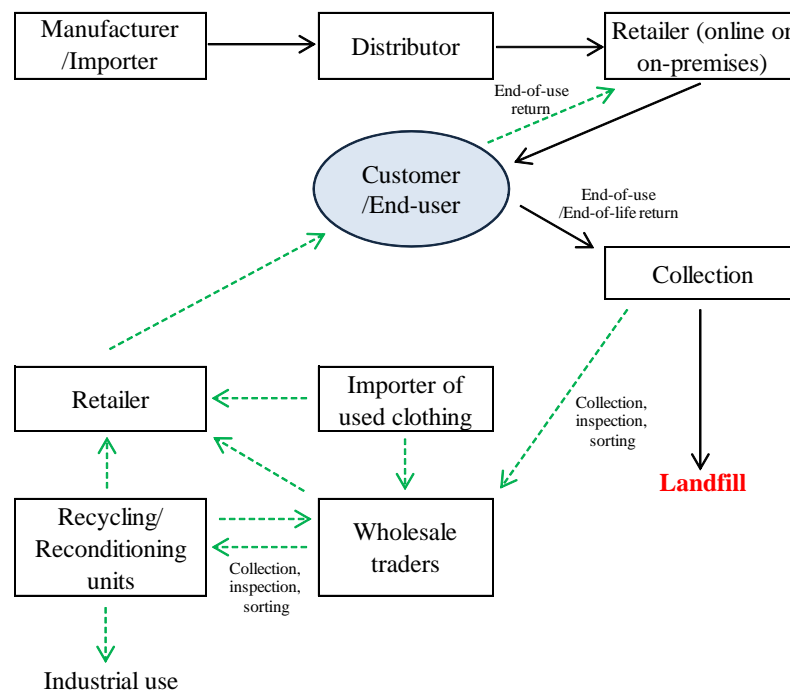
A lot of authors have written about the sustainable fashion apparel supply chain (Choi, Cai & Shen, 2019; Khurana & Ricchetti, 2016; O'Reilly & Kumar, 2016 and Niu, Chen & Zhang, 2017. The most cited were Khurana & Ricchetti, 2016.

The commitment of fashion industry to sustainability in SCM originated in the 1990s. The industry went through a trial and error process which eventually led to substantial changes in the industry's SC. The companies realized that they must look beyond monitoring, that they have to adopt a more comprehensive approach, look beyond the first tier of suppliers, integrate sustainability to their core business practices and make the processes in the SC more transparent (Khurana & Ricchetti, 2016).

Apparel SC includes upstream fabric suppliers, apparel manufacturers and downstream retailers. What makes it difficult to develop a more sustainable SC is a complex system of geographically widely dispersed smaller players within these three parts of the whole chain who usually operate independently and perform their own functions. SCM addresses a wide variety of environmental and social issues, such as use of environmentally preferred materials, reduction of waste, reduction in water and energy use, low impact dyeing processes, use of organic cotton, use of code of conduct and membership external programs (Kozlowski et al., 2015), so it is very unlikely that one company monitors and controls all the functions performed in their SC as the level of specialization is very high and very much treasured. Companies strive to make their SCs as efficient as possible and gain all the potential advantage they can by using "state-of-the-art" technologies (Choi et al., 2019).

Figure 11 roughly presents a comparison of two types of SCs in fashion industry: green arrows indicate sustainable fashion industry’s SC pathway and black arrows indicate the “usual” or non-sustainable SC pathway. In the end-of-use phase, the garment can either end up in landfill or it can be collected, sorted and recycled into a new product or used for other purposes, for instance in other industries.

Figure 11: Comparison of fashion industry's SC and sustainable fashion industry's SC



Adapted from O’Reilly & Kumar (2016).

As presented in Figure 11, O’Reilly & Kumar (2016) stress the importance of the reverse supply chain, which means closing the loop and thus making fashion industry circular. If fashion brands want to approach a circular business model, the garments recycling channels or returns-management processes must be enabled and better performed. A study in India showed that 57% of households indicated the intention to recycle but they fail to do so due to poor reverse supply chain factors mentioned above. Two thirds of respondents reported that they have troubles finding time to select garments and go to the recycling centres, and 63% of respondents find it difficult to find information on recycling options. The level of awareness among consumers regarding sustainability issues is increasing but they are unable to contribute their part due to lack of infrastructure and information.

One example of a fashion brand that puts great effort into combining its highly fragmented SC under one umbrella is the Swedish giant H&M (Choi et al., 2019). After several scandals in fashion industry reported since the 1980s such as Nike’s labour incident when in 1996 a picture of a boy sewing a Nike soccer ball was published in Life Magazine or when in 2013 the factory complex at Rana Plaza in Bangladesh collapsed and killed 1,138

workers and even more left severely injured, the companies started to take action (Khurana & Ricchetti, 2016). The fast fashion giant H&M was among the first ones in the industry to disclose the list of suppliers, which has been available on their website since 2013. Moreover, more than 130 employees work on ensuring that suppliers operate under H&M's requirements for good social and environmental conditions. With their program of continual follow-up, the Code of Conduct (Sustainability Commitment), the Code of Ethics and the Anti-Corruption Code the company tries to ensure the implementation of their sustainable practices across the whole supply chain (Choi et al., 2019).

What is interesting is the evidence showing the important role of NGO campaigns which have been playing one of the leading roles in setting objectives and means for fashion brands' strategies and decisions about sustainable approaches. It was not the individual consumers' preferences and purchase decisions that drove the companies toward sustainability, but the people as citizens through NGOs (Khurana & Ricchetti, 2016).

As opposed to the past, when different levels of fashion supply chains were very much separated and isolated, did not communicate and the transactions between them were rare, the situation today is completely different as members of the fashion SC form strategic partnerships both horizontally and vertically. An example of horizontally formed strategic partnership would be an alliance between manufacturers who share production capacities when larger orders occur. An example of vertically formed strategic alliance would be when different actions on different levels, such as vendor-managed-inventory program, forecasting and replenishment program, quick response program and collaborative planning, are performed in house (Choi et al., 2019).

The question remains about the extent to which fashion brands disclose the situation of their supply chain. Their disclosure policies are still being developed and adjusted but the fashion industry remains under public pressure due to controversy of the sector in terms of (un)sustainable practices (Khurana & Ricchetti, 2016).

2.2.3 Sustainable consumption in fashion

By far the most authors wrote about sustainable consumption in fashion (Bly, Gwozdz & Reisch, 2015; Cho, Gupta & Kim, 2015; Iran & Schrader, 2017; Lundblad & Davies, 2016; Park & Kim, 2016). The most cited among them were Lundblad & Davies, 2016.

Past studies show that only a small portion of consumers is concerned about sustainability when buying new clothes, which is often a consequence of costs consideration when buying clothes, poor image of sustainable fashion garments (as being untrendy, hippy or old-fashioned), lack of quality information, scepticism about fashion brands' transparency, lack of availability of ethical apparel, existing consumption habits and the feeling of powerlessness regarding own actions ("it does not make a difference if only I change my consumption habits") (Wiederhold & Martinez, 2018). What is more, there is a gap

between consumer intentions and actual behaviour/action taken by consumers as they often perceive themselves to be more environmentally aware and perceive their behaviour as more sustainable than it actually is (Connell, 2011). Another case is when consumers are aware of the importance of sustainability considerations but have reservations about purchasing sustainable garments (Han, Seo, Ko, 2017).

Knowledge about sustainability is a prerequisite for a more sustainable consumption, although studies showed that lack of clarity and constant trade-offs between different factors in relation to sustainability, such as choice of the material or labour standards, together with consumer's own distrust makes it very difficult to make sustainable decisions when buying clothes (Bly et al., 2015; Lueg et al., 2015). A study conducted by Han et al. (2017) showed that negative quality perceptions may, for example, come from lack of awareness and social capital regarding knowledge about eco-fashion.

An exploratory study of sustainable fashion consumption pioneers by Bly et al. (2015) showed that the participants in the study agreed about fast fashion model being a complete contradiction of sustainability as its main purpose is speed, consumption and change. Contrarily, sustainability is about slow(ness). *“Fashion producers and retailers, although they offer single sustainable options, still rely on hyper consumption and cheap prices to meet their business demand”* Bly et al. (2015) further elaborated their statement.

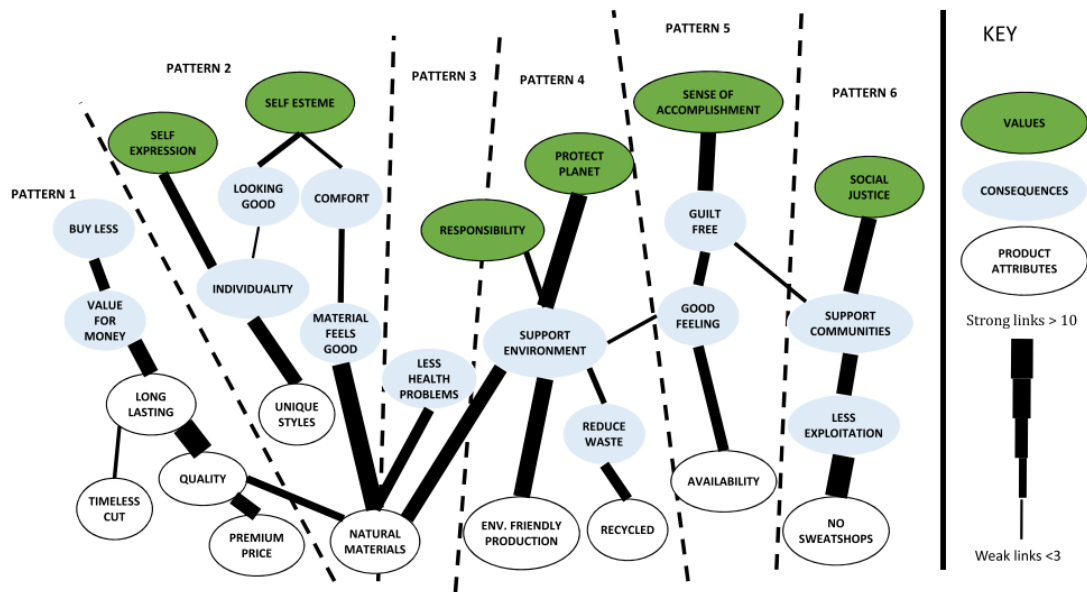
Sustainably oriented consumers claim that style should be the key driver of apparel consumption. They argue that style is driven by creativity and self-awareness. In reality, apparel consumption is too often driven by perpetual ‘seasonal’ and therefore unsustainable supply of garments. For more conscious consumers freedom from fashion is a more sustainable way of consuming because it negates the need for fast fashion garments that are imposed on customers by fast fashion companies (Bly et al., 2015). Another study supports this theory based on results of an online survey conducted in the US. The results showed that consumption based on style significantly influences one's practicing sustainable apparel consumption. The so-called »style consumption« magnifies the purchase of clothes made of organic and recycled materials, of low impact or non-dyeing processes or materials that require lower temperature when washing, shorter drying time and less ironing. The tendency of using/giving clothes to family or friends is also increased by style consumption as well as reuse of discarded clothing or resell/donation of used clothes to second-hand stores (Cho et al., 2015). With the spread of internet and technology, the second-hand purchasing of clothes or collaborative fashion consumption (as some authors call it), which includes renting, gifting, leasing etc. of clothes, was accelerated and broadened, and thus made available for the wider public. What was once a very common concept in the past when used clothes were gifted or borrowed among family members, friends or relatives, is now available not only for traditional P2P exchange but is also organized by companies (Iran & Schrader, 2017).

According to arguments made by participants in the exploratory study held by Bly et al. (2015), what makes it difficult for consumers to understand the unsustainable system in fashion industry is the physical distance between production locations of global brands and them (consumers). The distance makes consumers blind for all the negative externalities of the fast fashion system. The results of the study conducted by Pedersen & Andersen (2015) show that consumption behaviour can be challenged and redirected through campaigns and information sharing, such as PETA's anti-fur activities and the work of Clean Clothes Campaign (a global network which works towards improvement of working conditions and empowerment of workers in the global fashion industry). Organized information sharing is therefore an efficient way consumers can learn about the current issues in fashion industry. According to the study by Park & Kim (2016), only educated and informed consumers who are aware of negative social and environmental impact develop higher level of brand trust and brand affect toward sustainable fashion brands as their perceived value of sustainable brands is much higher than of the fast fashion brands, for instance. That is why it may be pointless to market environmentally friendly products to consumers who do not appreciate such features or they find them of insignificant importance. Hence, it is important to develop strategies to educate such consumers and inform them of the benefits when buying from sustainable fashion brands.

A study conducted by Cho et al. (2015) suggested that consumers who are more economical or tend to spend less money in their apparel consumption are more likely to buy sustainable garments. It is generally thought that sustainable garments are more expensive than fast fashion ones and are thus usually purchased by consumers with a higher-level income. The study suggested that when the idea of style consumption is presented to more frugal apparel consumers, they are more likely to buy sustainable products, since the timeless aspect of the style aligns well with their frugality because it reduces the need to constantly buy more clothes. Additionally, fashion consciousness and ecologically aware consumption improve the likelihood of style consumption which, as stated above, can be directly linked to the overall more sustainable apparel consumption.

Another study supports the argument that a better quality of sustainable clothes is one of the main motivations of sustainable consumption. A study conducted by Lundblad & Davies (2015) shows that although sustainable clothing is perceived to be of premium price, the higher quality of the products outweigh the extra cost. Values such as improved self-esteem and self-expression supported with the good feel of the material add up to quality. The participants agreed that good feeling might be psychological since *»you know that someone in the world hasn't suffered for making the product«*. Social justice, contributing to less exploitation and protecting the environment all add up to the sense of accomplishment when purchasing more sustainable garments. Figure 12 shows a more in-depth overview of product attributes, consequences and values for sustainable clothing consumption, and how strong are the links among them.

Figure 12: The hierarchical value map for sustainable clothing consumption



Source: Lundblad & Davies (2016).

3 SUSTAINABLE PRACTICES IMPLEMENTED IN FASHION INDUSTRY WITH THE FOCUS ON FAST FASHION

The changes in fashion industry must be made now in order to avoid a disaster. If the industry continues with the current pace which means that it continues with the same amount of effort towards reducing the emissions and decarbonisation, the emissions will amount to approximately 2.1 billion tons a year by 2030, which is approximately the same as the current amount. To put it in a perspective of the Paris agreement, of which the goal is to limit global warming below 2°C or preferably 1.5°C compared to pre-industrial levels, this would leave the levels of nearly double the maximum required to stay on the 1.5°C pathway (Berg et al., 2020).

The efforts should be intensified by the industry in order to align with the 1.5°C pathway in the following less than 10 years. This means that accelerated abatement should be embraced, which could reduce annual emissions for approximately 1.1 billion tons or around half of today's level. It is estimated that around 60% of emission abatement could come from changing upstream operations. This would be mostly possible by increased use of renewable energy, introduction of changes in spinning process, weaving and knitting, changing the processing from wet to dry, decreased overproduction and overall reduced amount of manufacturing-process wastage, consideration of circular business model etc. Around 20% of emission reduction could come as a result of changed brands' own operations and the remaining 20% could come from the changed consumer behaviour (Berg et al., 2020).

In essence, circular economy is the answer to hazardous effects of fashion industry. According to Ellen MacArthur Foundation (2017), the main components or phases of the circular economy are:

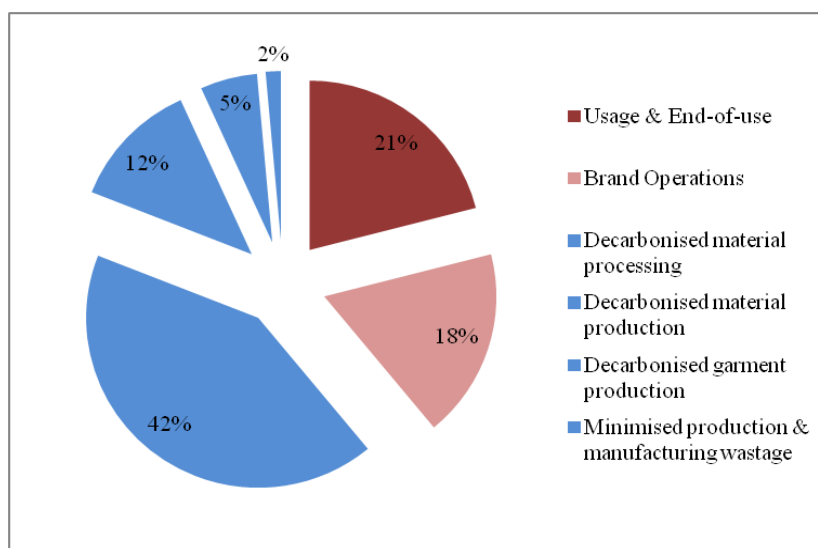
- 1) Abandoning the questionable or concerning substances and decreasing the amount of microfiber release,
- 2) Extending the clothing life-cycle by improving utilisation,
- 3) Drastically improving the overall recycling,
- 4) Effectively using the resources and moving to renewable resources.

A systemic and well-coordinated approach must certainly be taken in order to ensure that making progress in one area does not impede the progress in another. Collaboration among different players in the value chain is needed as well together with private and public sectors contributing their parts (Ellen MacArthur Foundation, 2017). Different sustainable practices within each of the above-mentioned phase according to Berg et al. (2020) will be described in the following chapters of the thesis.

3.1 Upstream operations

By decarbonising upstream value chain activities, approximately 61% of 1.7 billion tons of accelerated reduction of emissions potential can be achieved in 2030. This can be directly done through decarbonised material production, material processing and garment manufacturing, minimised production and manufacturing wastage (Berg et al., 2020). The blue part of the pie chart in Figure 13 presents the portion of emission savings within upstream production that can be achieved under accelerated abatement.

Figure 13: Emission savings within upstream production under accelerated abatement (in %)



Source: Berg et al. (2020).

3.1.1 Material sourcing

Material sourcing is one of the main phases in textile production. It is already enough complicated without sustainability included as many different aspects such as price, time, quality, relationships with sellers and geographical problems contribute to the process. Sustainable sourcing is about linking corporate governance with sustainability by following the guidelines set by the nature concerning the design in all levels of supply chain. A shift from choosing non-organically grown to organic fibres must be done, but this is only possible if people and organisations involved understand the environmental impact of their decisions (Karaosman, 2016).

The first and the main sources of every textile product is fibre. Cotton, wool, linen, silk, polyester, polyurethane, polyamide, acrylic or viscose are some of the most common materials of which an average piece of clothing comprises of. Natural fibres are cotton, wool, silk and flax. Contrarily, manufactured fibres, i.e. the ones that are not naturally grown, are of chemical origin, which means they are most commonly synthetic or made by a modification of natural resources. The amount of each component in a garment depends on the type of clothing, for example, cotton is usually the most common component of underwear, whereas polyamide is the most common component in swimwear. In general, 85% of all fibres used in clothing consist of cotton and polyester with cotton being the most dominant among naturally sourced fibres used in clothing (an overall 77% of naturally sourced fibre production originates from cotton) and polyester being the most frequently used in synthetic production (used in 77% of synthetic fibre production) (The Carbon Trust, 2011).

However, it is important to note that natural fibre production does not necessarily equal to environmentally friendly production. For instance, cotton production transmits 11% of pesticides and 24% insecticides utilized globally (Rissanen, 2008 in Karaosman 2016). Moreover, intensive water use in fibre production is another downside of the industry. Cotton production processes are often held in water-scarce areas such as China, India, Pakistan, Turkey and US. In China, for instance, as much as 80-90% of fabric, plastic-based fibres and yarn are sourced in regions where water is scarce. The production of textiles (with cotton farming included) requires approximately 93 billion cubic meters of water per year, which accounts to 4% of the overall consumption of freshwater globally (Ellen MacArthur Foundation, 2017).

In addition to extensive water use, there is also a problem of limited quality agricultural land. Natural fibres can be either cellulose- or protein-based and both need productive land as well as fresh water resources. Cotton production currently accounts for approximately 2.5% of world's arable land. Wool production demands even more land as, for instance, 278 hectares of land are needed in order to produce 1 ton of wool fibres (compared with only 1 hectare per ton for cotton). Since the world population is growing, higher demand

for land for food production is expected, which might consequently lead to reduced cotton and wool production (Ellen MacArthur Foundation, 2017).

On the other hand, production of polyester requires resources which are of limited amount and where a considerable amount of energy is consumed. In polyester production process, antimony is often used as a catalyst. When antimony trioxide leaks during high-temperature dyeing processes, it can end up in wastewater which increases the chances of health issues, such as bronchitis for instance (Rissanen, 2008 in Karaosman 2016). Sadly, textile industry is very much dependent on non-renewable resources in all phases of the value chain. On average, the number amounts to 98 million tons of non-renewable resources per year, which includes pesticides, fertilizers, chemicals and other environmentally harmful sources. In addition to that, every year an estimated 342 million barrels of oil is used for plastic-based fibres for textiles production. Moreover, approximately 200,000 tons of pesticides and 8 million tons of fertilisers are required annually for cotton production together with around 43 million tons of chemicals, such as dyes or chemicals for finishing treatments (Ellen MacArthur Foundation, 2017).

To sum up, the very first step of garment production, i.e. material sourcing, is already an opportunity for fashion brands to improve their existing processes and become more sustainable and less harmful to the environment. Sustainable practices implemented by fast fashion brands within material sourcing phase will be presented in the following subchapters.

3.1.1.1 Decarbonised material production

Decarbonisation of material production could decrease GHG emissions by 205 million tons on the annual level. This assumes approximately 20% of improvements made in the area of energy efficiency in the production of polyester, which would result from improved machinery, and around 40% reduction of fertilizer and pesticide use in cotton production, which would result from improved farming practices. As said before, fertilizers are a great source of GHG emissions, which come from nitrogen. In addition to that, pesticides emit great amounts of carbon during the manufacturing process (Berg et al., 2020).

In order to decarbonise material production, Primark has supported China's Institute of Public and Environmental Affairs' (hereinafter "IPE") environmental portal for several years now. The IPE's goal is to drive the industry-wide improvements by encouraging suppliers to take accountability of their supply chains which leave a footprint on the environment. IPE asks suppliers through their online portal to publish their environmental data, such as wastewater discharge, water and energy consumption and discharged emissions. Brands, such as Primark, can participate in the initiative in order to encourage the implementation of environmental practices among their suppliers by arranging an onsite 3rd party audit, for instance. If any irregularities are detected, they have to be removed or improved in order for IPE to remove the violation records (Primark, 2019).

In Table 2, the Corporate Information Transparency Index (hereinafter “CITI”) evaluation is summed up for some of the biggest fast fashion brands. The Green Supply Chain CITI evaluation assesses brands based on the management of their supply chains in China in terms of sustainability and environmental awareness. The scores are published by China's IPE and are updated several times per year as the companies constantly work with their suppliers to address global pollution (Institute of Public and Environmental Affairs [IPE], n.d.).

Table 2: CITI evaluation by IPE for some of the biggest fast fashion brands

		Primark	C&A	Nike	Inditex Group	Adidas	H&M	Gap Inc.
Responsive-ness and transparency	Respond to enquiries and engage with public	6/6	6/6	6/6	6/6	6/6	6/6	6/6
	Promote supply chain transparency	7/8	8/8	7.5/8	8/8	7.5/8	6/8	8/8
Compliance and corrective actions	Push suppliers to take corrective actions	10/12	12/12	10/12	11/12	10/12	9/12	7/12
Extended green supply chain practices	Responsible management of chemical suppliers	4/6	5/6	4.5/6	4.5/6	4/6	4/6	3/6
	Responsible management of wastewater	5.25/10	5.25/10	4.2/10	4.55/10	4.2/10	1.75/10	3.5/10
	Responsible management of solid waste (including hazardous waste)	1.8/10	2.25/10	3/10	1.95/10	1.35/10	0.75/10	0.9/10
	Responsible management of logistic suppliers	1.5/4	3/4	1/4	2/4	1.5/4	1/4	0/4
Energy conservation and emissions reduction	Push suppliers to reduce their energy use and carbon footprint and disclose energy and climate data	8.2/20	11.36/20	12.88/20	11.57/20	13.02/20	10.02/20	13.04/20
	Push suppliers to reduce resource use and pollutant emissions and disclose pollutant release and transfer data	9.5/12	8/12	8/12	8/12	8/12	8/12	6/12
Total CITI score		70.25	80.36	72.08	71.57	69.07	59.52	61.44
Final ranking		5	2	3	4	6	13	12

Source: IPE (n.d.).

The evaluation for each specific area in Table 2 represents the share of achieved points from the total available points (for example 8/12 means 8 points achieved from the total 12 points). The CITI score is a summary assessment based on the assessment of the following areas:

- Responsiveness and transparency,
- Compliance and corrective actions,
- Extended green supply chain practices,
- Energy conservation and emissions reduction, and
- Promotion of public green choice.

The “Responding to enquiries and engaging with public” criterion is scored within the Responsiveness and transparency area. The example of complying with this criterion is when a brand appoints someone, its representative for example, to investigate a supplier regarding its potential environmental violation(s). It also includes pushing the supplier towards higher level of transparency, i.e. issuing a public explanation. Moreover, the “Promoting supply chain transparency” criterion means that brands update published lists of suppliers in China at least on the annual level. The lists shall include higher environmental impact suppliers. By publicly disclosing such information, the suppliers are pushed to track their environmental compliance performance. Based on the given results, the brands have no troubles complying with the two mentioned criteria (IPE, n.d.).

The area of “Compliance and corrective actions” includes the “Pushing suppliers to take corrective actions” criterion, which means that suppliers are pushed to take on corrective actions and are therefore forced to be more transparent by publishing a public explanation about the reasons for violation as well as issuing corrective actions to improve their usual practice. Moreover, the compliance status should be published in a timely manner. C&A scored all points for this criterion (IPE, n.d.).

The “Responsible management of chemical suppliers” (meaning that the brand publicly requires environmental compliance from chemical suppliers), “Responsible management of wastewater” (meaning that corrective actions must be taken by the wastewater treatment facilities that did not comply with environmental standards), “Responsible management of solid waste (including hazardous waste)” (meaning that brands push the solid waste transportation and disposal entities to follow up on their own environmental compliance performance) and “Responsible management of logistic suppliers” (indicating environmental compliance required from logistics suppliers) criteria are scored within the area of “Extended green supply chain practices”. The lowest scores were in the area of the solid waste management. Based on the results, H&M and Gap Inc. do not pay attention to this area of environmental compliance. Nike scored the most points among other brands (3/10), indicating that the brand implemented a certain level of management for the purposes of solving this issue and that they track the environmental compliance performance of suppliers’ solid waste transportation and disposal entities (IPE, n.d.).

The “Pushing suppliers to reduce their energy use and carbon footprint and disclose energy and climate data” (which means that the brands make the supply chains more traceable, so it is easier to understand by the public how the environmental impacts are managed in the upstream production process) and “Pushing suppliers to reduce resource use and pollutant emissions and disclose pollutant release and transfer data” (which means that brands and their most polluting suppliers publicly disclose the use of inputs and their objectives regarding decreasing the pollutant emissions) were the criteria scored within the “Energy conservation and emissions reduction” area. The scores show that most brands calculate or are beginning to calculate the GHG emissions and manage them in their value chain or already implement the initiatives to reduce them. Primark scored the highest points (9.5/12) in the area of reducing the resource use and pollutant emissions. Their score means that the brand continuously verifies the rigor of resource use and pollution emissions with the public data. They also publish best practices to address this issue in the supply chain in China (IPE, n.d.).

3.1.1.2 Innovations regarding material sourcing

Innovation is very much needed in order to decrease the negative impact of fibre production. Recycling PET bottles can be one option in order to reduce carbon footprint. Adidas, for example, is already doing it. This sportswear giant partnered up with the environmental organisation and global collaboration network Parley for the Oceans which is dedicated to raising awareness about the importance of the ecosystems and especially of the ocean. Adidas and Parley for the Oceans together intercepted plastic from the beaches and created the very first running shoe made of upcycled plastic waste in 2015. By the end of 2020, more than half of polyester used in Adidas’ production processes was recycled polyester. The company plans to completely stop using virgin polyester by 2024 (Adidas, 2021d). Adidas is partnering up with start-ups, other organizations and designers either to develop new materials (development of leather-like material made from mycelium – the underground threads which fruit mushrooms) or to achieve a more carbon efficient production process (the brand reports about carbon footprint of a pair of sneakers being on average 10 - 15 kilograms of carbon dioxide (hereinafter ”CO₂”), but has been working on the sneakers production process which will ideally have carbon footprint of 2 kilograms of CO₂ or less) (Adidas, 2021c).

Nike as well uses recycled polyester from plastic bottles to make their products. Moreover, they transform a variety of materials, like carpets and used fish nets, to make recycled nylon. Shoe soles from Nike Air collection are made of minimum 50% recycled manufacturing waste and the production of Nike Flyknit shoes’ upper lightweight fabric generates 60% less waste than than in the usual manufacturing process of the upper footwear part. Nike’s Flyleather is made by binding at least 50% recycled leather fibres with synthetic fibres, thus creating less waste. In 2020, Nike's use of sustainable materials

in apparel (which include organic cotton, recycled materials etc.) jumped from 41% to 59% (Nike, Inc., 2021).

Both Adidas and Nike put great emphasis on communicating their sustainable strategies to tackle waste problems and innovations developed to their consumers. For the past few years, Adidas has been strongly focusing on plastic waste problem. Their plan is to either made products from recycled materials (such as Parley Ocean Plastics), to make products that can be remade (the first such product available for buying is UltraBOOST DNA LOOP running shoe) or to make them from natural materials. Natural materials ensure that in case of disposing the product in the environment when worn out, there will be minimum harm to nature. To achieve this, the products shall be made of natural materials or of materials made of cells and proteins that can be returned to nature (Adidas US, 2021).

In addition, Adidas is spreading awareness on mindful consumption and on reducing carbon footprint in different aspects of life through social media and through company's blog posts. The brand is not solely focusing on fashion but tries to communicate different actions that can be taken in everyday life to reduce carbon footprint and improve the wellbeing of people and nature.

Nike similarly takes different and innovative approaches to communicate their path toward zero carbon and zero waste. Just recently they have published a conversation between marine biologist and climate expert Dr. Ayana Elizabeth Johnson and famous singer and songwriter Billie Eilish where they talked about climate change, about what an individual can do to help make a change and how to stay optimistic about the future. It is a very different and innovative way to spread awareness among a specific target audience. Moreover, Nike offers guidelines for a circular business model which tackle all aspects of product design, such as material choices, cyclability (how the product is recycled at the end of use), managing waste, disassembly (how to design a product that can be easily taken apart and recycled), greener chemical products etc. (Nike, Inc., n.d.).

The benefits of such initiatives are enormous when put on a global scale. If only 10% of cotton fabric was switched to 50:50 polycotton-blended fabric, the amount of waste generated would be reduced by approximately 1.7%, negative impact on water would be reduced by 3% and carbon emissions would be reduced by 0.4% (Karaosman, 2016).

3.1.1.3 Initiatives for regenerative agriculture

Certified organic cotton restricts the use of synthetic fertilizers and pesticides and currently amounts to less than 1% of global cotton market. However, Better Cotton Initiative (hereinafter “BCI”) reduces the use of synthetic fertilizers and pesticides for roughly 12% (Ellen MacArthur Foundation, 2017). BCI is the largest programme in the world that promotes cotton sustainability and it was started in 2005 with the initial support from different companies and organizations, such as Adidas, Gap Inc., H&M, Ikea, International

Federation of Agricultural Producers etc. Helping the communities, where cotton growing is the main source of income, in a way they do not only survive but enabling them to grow and improve is the main mission of the BCI together with protecting and restoring the environment at the same time. Today, BCI is supported by 2,100 members from different spheres and areas, such as farmers, ginners, spinners, suppliers, manufacturers, brand owners, retailers, civil society organizations, donors and governments (Better Cotton, n.d.).

New opportunities are enabled for the tiniest smallholders by improving the soil and water management and by better managing the use of pesticides which all improve the environmental impact of cotton growing as well as making them less vulnerable to the general climate change. Improved crop enables smallholders to penetrate new markets but it also improves the general situation of the large farmers for whom improvements mean decent work, gender empowerment and less inequality (Better Cotton, n.d.). One of the latest BCI actions, for instance, was improving the irrigation system in cotton fields in Tajikistan where water scarcity is a major concern for farmers and communities. By implementing a new and more efficient irrigation system, they managed to roughly half the volume of water used they were using before, only few years ago (Better Cotton, 2021).

Long-term relationships and partnerships could help many farmers to maintain sustainable production and increase inflow of resources for their further cotton production. Moreover, partnerships could efficiently address poverty in rural areas and improve their communities (Ellen MacArthur Foundation, 2017).

Another initiative that supports sustainable production of cotton is Cotton made in Africa, an initiative of the Aid by Trade Foundation. The main goal of the Cotton made in Africa initiative is to enable people to improve their own situation by themselves through trade of cotton rather through donations. They aim to improve living standard and working conditions of smallholder farmers in Africa, as well as to protect the environment (Cotton made in Africa, n.d.).

Such initiatives make huge contributions to promotion of reduced use of pesticides, preservation of soil health and improvement of the health of farmers. The research showed that such practices reduced the use of pesticides in Pakistan by approximately 32% (Ellen MacArthur Foundation, 2017).

Moreover, finding solutions regarding water consumption in production process has been on H&M's agenda for the past few years. H&M's suppliers had to implement rainwater harvesting systems if feasible (39% of facilities in H&M's supply chain have implemented it) or reduce water consumption in production processes by setting water management requirements for suppliers (H&M Group, 2021a).

Primark introduced another approach, as they partnered up with CottonConnect and the Self Employed Women's association (SEWA) in 2013 in order to start developing Primark Sustainable Cotton Programme in India. The initiative was expanded to Pakistan in 2018

and China in 2019. The first products were launched in 2017 and more than 23 million of Primark products were made with sustainable cotton by 2019. Moreover, in India alone the water use decreased by 4%, the yield increase amounted to 10%, the use of chemical fertilizer decreased by 25%, average farmer profit increased by 200% and the use of chemical pesticide decreased by 50% (Primark, 2019).

3.1.2 Textile production

It is not only the use of raw materials that leaves the biggest footprint by the fashion industry. In 2015, for example, the total GHG emissions from textile production only amounted to 1.2 billion tons of CO₂ equivalent. The amount is more than the total GHG emissions produced from international flights and maritime shipping combined. A production of 1 ton of textiles generates 17 tons of CO₂ equivalents, for instance, which is far more than what is produced for 1 ton of plastic (3.5 tons produced CO₂ equivalent) or for 1 ton of paper (less than 1 ton of CO₂ equivalent) (Ellen MacArthur Foundation, 2017).

Besides releasing great amounts of CO₂ in textile production processes, toxic chemicals and other substances are released directly into rivers on which locals depend greatly. The Citarum River in Indonesia, for example, has more than 200 textile factories along its banks which constantly release dyes and other chemicals into the river, making it change the colour and devastate the ecosystem. Not to mention the workers in such factories who are directly exposed to toxic substances (Ellen MacArthur Foundation, 2017).

The sports apparel brand Nike has set a goal to source only from factories that are in line with their definition of sustainable in order to reduce the emissions during the textile production process. To do that, they use colour-coded ratings for their factories where they outsource from. The colours reflect factory's sustainability performance which combines different factors (e.g. lean manufacturing, labour and health, safety and environment). Factories that do not reach Nike's standards for compliance receive yellow or red rating. Bronze rating indicates foundational compliance with Nike's Code of Conduct and Code Leadership Standards, and silver and gold go beyond that. Nike's goal is to source 100% from factories that are rated bronze or better. In 2020, they reached the 94%-target. In 2020, the brand also reduced its number of suppliers as they want to cooperate only with the ones they share their commitment to sustainability with (Nike, Inc., 2021).

In addition to the above, Nike puts great effort into building long-lasting relationships with its contract manufacturing suppliers. More than 90% of Nike's suppliers, i.e. factories that manufacture their branded clothing lines, have been working with the brand for more than 15 years. In response to the scandalous events in the past regarding labour conditions, Nike also introduced forecasts and processes to solve the issue of excessive overtime for example and others which are the result of overly disruptive fluctuations in demand (Nike Purpose, n.d.).

On the other hand, Adidas provides guidelines and comprehensive policies regarding environmental footprint as their production is fully outsourced. Monthly progress is measured in order to reach the targets for reduced energy and water consumption and waste generation on a yearly basis. Moreover, they support their suppliers by increasing the level of on-site renewable energy use by funding and providing technical support for solar rooftop feasibility to 80% of their suppliers in Vietnam, Cambodia, China, Indonesia and Myanmar (Adidas, 2021a). The brand also discloses their global suppliers (updated twice a year) as they publish the names of the suppliers that process materials for the brand's primary suppliers and subcontractors, who then perform most of the of wet processes (most water-intense processes in the garment manufacture phase, such as dyeing and finishing of materials) (Adidas, 2021b). In this way, Adidas emphasizes the accountability of both parties involved – Adidas as a brand and the supplier involved.

Another 703 million tons of GHG emissions savings could be done through decarbonisation of material processing. This assumes full usage of renewable energy and efficiency improvements. It is estimated that a 5%-efficiency gain would be achieved through improved spinning, weaving and knitting, for instance, as well as through motor and air pressure modifications in machinery. The potential reduction of GHG emissions also assumes a switch from wet to dry processing technologies which result in less consumed energy. Last but not least, the analysis assumes only the use of renewable energy in the processing phases for which it is necessary to be supported by brands and retailers (Berg et al., 2020).

Additionally, improved waste management could also lead to 24 million tons of GHG emissions savings (Berg et al., 2020). Approximately 20% of the fabric is thrown away as a waste (Rissanen, 2008 in Karaosman 2016). To achieve 24 million tons of GHG emissions savings, it is assumed that only 1-2 percentage point improvement in waste generated when transitioning from fibre to textile and in cutting waste in garment manufacturing phase (which could be done through better design and modern cutting techniques) would be necessary (Berg et al., 2020).

Nike reported in its Impact report for 2020 about not being able to decrease their carbon footprint in 2020 comparing to 2015, despite the adoption of sustainable materials and reduced material waste intensity. The progress made in some areas was offset by inbound airfreight, increased carbon intensity of electricity grids at some of Nike's main manufacturing regions and by production of less carbon efficient footwear which was due to demand. Introduction of new footwear products also involved less carbon efficient materials and processes which contributed to Nike's carbon footprint (Nike, Inc., 2021).

3.1.2.1 Improving energy efficiency

The support of energy transition of the upstream operations is assumed to be performed by brands and retailers who are supposed to represent the key players in this transition. One

way of achieving successful transition is through power purchase agreements (hereinafter “PPA”) in the countries where the energy is supplied from. PPAs are long-term contracts which are signed with the goal of purchasing energy during the agreed period. In order to secure a successful investment and financing of the renewable power asset and a long-term (10 to 20 years) offtake agreement, brands can utilize their good name in terms of higher credit rating for the more favourable terms agreed in the future. There is an increased use of PPAs in major supplier countries such as China, India and Vietnam, except for Bangladesh and Turkey where there are not available (Berg et al., 2020). Adidas is working on their renewable energy pilot project in Vietnam, where the fashion giant provides technical support to its key suppliers. The project features PPA mechanism which includes both the companies that generate the power and private power buyers/consumers (Adidas, 2021a).

Supporting the purchase of unbundled Energy Attribute Certificates is another option for brands. These instruments ensure that the sustainable power source generated the renewable electricity in question, which is then sent back to the electricity grid. Energy Attribute Certificates can be purchased by players in different levels of the value chains, which can be encouraged or even rewarded by the brands themselves. China, India and Turkey already offer such certificates, while they are only starting to become the common practices in Bangladesh, Indonesia and Vietnam. Energy transition through the use of 100% renewable energy offers very promising results in the long term. Corporate groups such as RE100 (a global initiative, comprised of hundreds of ambitious companies and brands, which are committed to the use of 100% renewable electricity) are the drivers of this agenda whose goal is growth of renewable energy sourcing. If big brands in fashion industry supported this initiative, a significant acceleration of energy transition in suppliers’ regions would be achieved (Berg et al., 2020).

Some of the biggest fashion brands already put great efforts into transforming and improving their energy efficiency. In 2020, 81% of electricity used in Inditex Group’s facilities, such as stores, logistic centres or headquarters, came from renewable energy sources. This was their target for 2025, but they reached it in 2020 already (Inditex Group, 2021). On the other hand, 90% of electricity purchased by H&M’s for their own operations come from renewable energy sources which is 6% less than in 2018 and 2019. This was the result of H&M’s adjustment to the new RE100’s market boundary criteria, which was introduced in mid-2019 and affected H&M’s renewable energy sourcing process. Their goal is to use 100% of renewable energy by 2030 (H&M Group, 2021a). Adidas for example reported about their sources for electricity in Germany being 100% from renewable sources in 2020 (Adidas, 2021c). This is mainly the result of Adidas’ energy saving initiatives, the use of before mentioned Energy Attribute Certificates at central locations and the introduction of photovoltaic systems at various locations (Adidas, 2021a).

Nike already wanted to achieve 100% renewable energy in own and operated facilities in 2020 but reached only 48% in the mentioned year. Their goal now is to use 100% renewable energy in own facilities by 2025. In the US, the brand concluded 2 PPAs - committing to more than \$165 million in renewable energy over the contracts' durations (Nike, Inc., 2021).

3.1.2.2 Adoption of restricted substances lists

Adoption of restricted substances lists (hereinafter "RSLs"), manufacturing restricted substances lists (hereinafter "MRSLs") and voluntary standards would additionally increase transparency of the industry. Low transparency on the chemicals used in textile production processes is especially problematic, which leads to numerous challenges in addressing the use of substances of concern. Policymakers have an important role here as they need to accelerate the transition to less hazardous processes. Additionally, it is important to target this goal collectively and not individually as manufacturers across the value chains may face difficulties when dealing with different standards and rules which can therefore slow down the progress (Ellen MacArthur Foundation, 2017).

Inditex Group for example adopted the so-called "The list by Inditex" in 2013, which was the first programme of such kind in textile and leather industry. Its goal is to improve the quality of chemical products used in garment manufacturing processes. Moreover, it ensures compliance of companies with chemical restrictions covered by the product health standard "Clear to Wear" and with the group's general commitment to achieve the Zero Discharge of Hazardous Chemicals (hereinafter "ZDHC") (Inditex Group, 2021).

In 2020, H&M had a goal of 100% supplier factories being compliant with ZDHC MRSL. They managed to reach a 88%-compliance, which is 8% more than in the year before (H&M Group, 2021a). Adidas is constantly developing and updating the ZDHC MRSL and the ZDHC Chemical Management Guidance Framework, which represents a critical connection between controlling the chemical input and monitoring the final result (Adidas, 2021a). Nike is no exception from the rest of the brands that have adopted RSL and ZDHC (Nike, Inc., 2021). Primark as well became a member of ZDHC in 2015 and they had also signed up to Greenpeace's Detox commitment a year before that with the aim of doing more than just complying with the EU and US legislation. The Greenpeace's Detox commitment aims at working towards eliminating substances which are deemed to be hazardous from their supply chain. The firm adopted their own RSL. Moreover, Primark's policy is also setting standards with which potential new manufacturers must comply before their first cooperation. They are known for this clothing production strategy as they do not own any production plants but rather source from other producers and suppliers (Primark, 2019).

3.1.2.3 Use of alternative chemicals

As said before, chemicals contribute enormous amount of negative effects both in fibre sourcing processes and in textile production phase. However, alternatives to chemicals can be used for dyeing of textile, for example. The chemical company Archroma has developed “Earthcolours”, which are extracted from agricultural waste. The use of such dyes is water- and energy-saving, iron- and formaldehyde-free, and can easily substitute the usually used oil-based dyes for cellulose-based fibres (Ellen MacArthur Foundation, 2017).

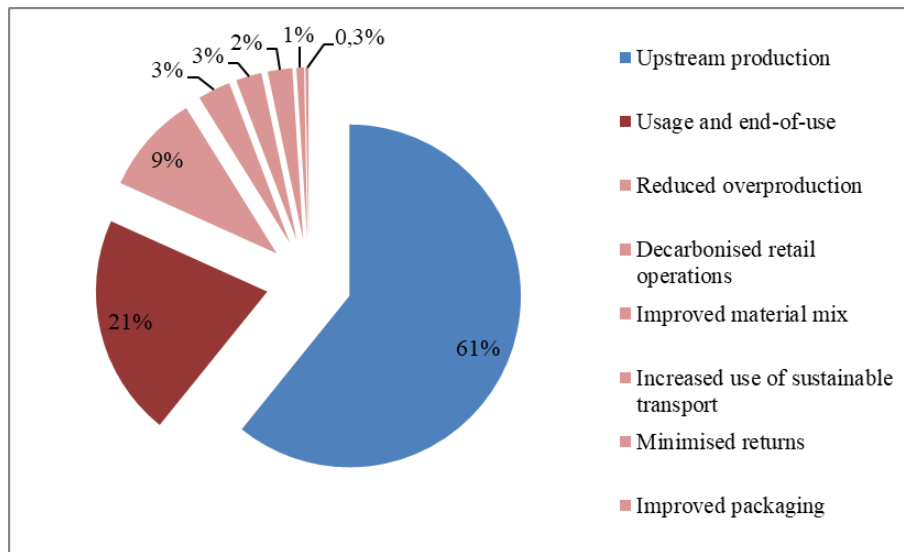
Another example is chemical manufacturer DyStar, which has developed and produced a range of dyes with a Cradle to Cradle Gold (hereinafter “C2C”) certification. This certificate is a well known criterion of safer, more sustainable products which are the result of the circular business model. These dyes were used in C&A’s large-scale pilot project. C&A’s T-shirts, coloured with C2C certified dyes, achieved C2C Gold level - the second best, but overall they also achieved the highest Platinum requirements for material health, renewable energy and water stewardship. The Platinum level means that no harmful substances are used in the product neither in the final stage of production which includes the dyeing process as well. Additionally, C&A used certified organic cotton for their T-shirts, which all together means that the product can be thrown in a home composting-unit and would decompose in 12 weeks (Ellen MacArthur Foundation, 2017).

Algae-based dyes are another possible alternative to be used instead of traditional textile dyes. The use of algae in dyes was demonstrated in the EU Life project Seacolours and by designers Blond & Bieber (Ellen MacArthur Foundation, 2017).

3.2 Brands’ own operations

Brands can contribute to approximately 18% of reduction of the emissions by decarbonising their own and direct operations. This can be done through improving the material mix, increased use of sustainable transport, improved packaging, decarbonised retail operations, minimizing the returns and reducing overproduction (Berg et al., 2020). The light purple portion of the pie chart in Figure 14 presents the amount of potential emissions savings within brands’ own operations.

Figure 14: Emission savings within brands' own operations under accelerated abatement (in %)



Source: Berg et al. (2020).

3.2.1 Improved material mix

Improved material mix could reduce GHG emissions by around 41 million tons. Such reduction could be achieved by 2030 if the use of recycled polyester would amount to 20% of an overall polyester use and if 11% of used materials would be alternative fibres and materials, for example organic, recycled or bio based. The use of sustainable materials leads to reduction of upstream activities as there are cleaner production processes in place. The use of recycled instead of virgin materials could also contribute its part. Organic cotton for example is around 50% less emissions intensive than conventional cotton as less pesticides and fertilizers are used with more advanced farming techniques (Berg et al., 2020).

One of the strategies of Inditex Group to meet their sustainability goals is using sustainable raw materials and developing environmentally friendly production processes. In 2020, they exceeded their target of 25% of “Join Life” garments produced in that year as they reached 38% of units manufactured under this label. The group collaborates with several initiatives such as Textile Exchange, BCI, and they are even one of the founders of the Organic Cotton Accelerator initiative. The group’s goal is to use 100% sustainable cotton by 2025 (Inditex Group, 2021).

On the other hand, H&M, Adidas and Nike went one step further. As of 2020, H&M and Nike’s exclusively source was recycled cotton, organic cotton or cotton sourced through the above-mentioned BCI (H&M Group, 2021a; Nike, Inc., 2021), and Adidas used only sustainable cotton which means that it either uses organic cotton or any other formation of

sustainably produced cotton available at the moment or in the future, and Better Cotton) from 2018 on in accordance with the BCI (Adidas, 2021a). With the aim of making the production of cotton more sustainable in terms of the environment and the people producing it, H&M joined the BCI in 2010. In reference to cotton, H&M achieved their goal. Now their goal is to strengthen their cotton strategy and to expand the criteria for cotton sourcing in a more sustainable way (H&M Group, 2021a).

In addition to cotton, H&M also put wood products on their agenda. The goal by 2025 is to use only wood in their products and packaging which is made of Forest Stewardship Council certified materials or fibres from alternative sources, for example agricultural waste and post-consumer textile waste. Overall, in 2020 H&M used 64.5% of recycled or more sustainably sourced materials in their textile production (H&M Group, 2021a).

Recycled polyethylene tetrachloride (hereinafter “RPET”) is another alternative as organic cotton. Polyethylene tetrachloride (or PET) is one of the most used plastics in packaging and clothing. The reason for its wide use is that it can be easily moulded while still retaining its durability and strength (Cesca, 2020). PET produces 40% more emissions than RPET and this is because the production of RPET is less intensive due to the use of recycled materials and because of the overall closed-loop model. Modal and Lyocell, which are man-made cellulose fibres, are another sustainable alternatives. Their production emits approximately 50% less emissions than the production of conventional fibres of such kind, which is, again, the result of the closed-loop business model. All things considered, the use of such materials solely depends on the level of adoption of sustainable materials. Companies will need to find ways to decrease costs while scaling up the adoption of sustainable materials (Berg et al., 2020).

Inditex already has the RPET on their agenda for the near future. Their goal is to define a strategy which would guarantee the supply of RPET in line with their goal of 100% sustainable polyester by 2025 (Inditex Group, 2021). Similarly, Adidas aims to replace all virgin polyester used in their production process and use recycled polyester instead by 2024. In 2020, the brand introduced the »Primeblue« (high-performance yarn that contains 50% of Parley Ocean Plastic) and »Primegreen« (high-performance fabrics that contain a minimum of 40% recycled content) labels which mark products made of recycled polyester. In 2020, the use of RPET in Adidas’ apparel and footwear already amounted to 71% (Adidas, 2021a).

Besides clothing collections, Primark improved their product mix of their beauty products. All of their products are “Leaping bunny accredited” which means they are cruelty free (Primark, 2019).

3.2.2 Increased use of sustainable transport

Adoption of more sustainable transport could result in reduction of GHG emissions by around 39 million tons. This could be done through increased use of sea transport by 90% and reduction of air transport by 10% across the whole fashion industry. Comparing to today, 83% of transportation is done by sea and 17% by air. Rapid digitalisation, investments in more demand-focused regional supply chains and nearshoring are necessary in order to achieve the mentioned goals. Furthermore, the 39 million tons of GHG emissions savings assume that 90% of the B2C light transport fleet would be electrified and supported by legislative incentives and further development of battery technology (Berg et al., 2020).

Adidas can already boast about the vast majority of its transport being carried out via sea freight - 91% of apparel, 98% of footwear and 80% of accessories and gear are shipped by sea, meaning that very little is transported by trucks or via air freight (Adidas, 2021a). Nike as well organizes the majority of product travels from factories to the final destination by sea. They aim to increase the use of alternative fuels, especially electrification, for last mile deliveries (Nike, Inc., 2021).

Instead of complete transformation of logistic processes, optimisation of transportation could be done in the first place. By optimising the packaging, the load optimisation can be achieved and thus the number of vehicles on the road can be reduced. Inditex is doing just that, as 1,600 vehicles were saved in 2020 comparing to 2019 as a consequence of this measure. The kilometres driven and associated emissions produced were therefore reduced. They also use high-capacity vehicles (like giga trailers) which are larger in load volume and reduce CO₂ emissions. In China, the use of last-mile electric vehicle for delivery to stores is also in place, which reduces GHG emissions and air pollution in cities (Inditex Group, 2021).

In 2020, H&M as well implemented last mile delivery for online orders placed in Germany, Italy, Sweden and United Kingdom. The initiative is called climate-smart delivery and it includes electrical vehicles and pedal cycles. They also reduced the use of fossil fuels and instead started using biogas and biodiesel. 27 of their markets have some version of climate-smart delivery (H&M Group, 2021a).

Primark aims to improve transport efficiency by increasing the use of double deck trailers on high-volume routes by 25% which resulted in 350,000 saved road kilometres across the network and enabled 340 tons of CO₂ to be saved in 2019. Additionally, double stacking created space for extra cartons per truck on average. Consequently, the use of short-sea ferry crossings increased as well (Primark, 2019).

3.2.3 Improved packaging

5 million tons of GHG emissions could be saved by implementing improvements in packaging. This assumes increased use of recycled content and recycled low-density polyethylene through improved material functionality and lower production costs. Moreover, it assumes reduction of weight in corrugated boxes which would be done through reduction of layers from five to three and reduction of polybag weight by around 20% which would be done through improved design (Berg et al., 2020).

Inditex is significantly prioritising the use of recycled materials for their packaging. They managed to implement 64% of recycled cardboard into their boxes for shipments. They source the waste cardboard from the market and enable the use of such recycled boxes for up to 5 times before recycling them for further use. Moreover, in 2020 they increased the use of envelopes instead of traditional boxes for Zara online shipments by 8%, thus reducing their consumption materials. Additionally, they also tried to optimize packaging by shipping items in bulk pallets, which resulted in 65% reduction of plastic and 80% reduction of cardboard and saving 60,000 meters of tape. In 2020, all Inditex brands reached the goal of using only paper bags in stores and completely removing the plastics from online-orders boxes (Inditex Group, 2021).

Reduction of packaging volume is on H&M's agenda as well. In 2020, the Group reduced the amount of overall packaging by 14%, including the reduction of the plastic packaging by 24% (compared to 2019). They have another initiative in place, as they are planning to phase out the single-use plastic and replace it with FSC-certified paper (paper comes from responsibly managed forests, providing environmental, social and economic benefits) in their online-orders packaging. They plan the FSC-certified paper to be fully used by 2022 (H&M Group, 2021a).

Adidas similarly focused on transport packaging, where the use of plastic packaging still seems unavoidable, as they already phased out plastic bags in retail stores by 2016 and single use plastic across the majority of Adidas' locations worldwide by 2018. The brand is researching the ways to recycle used polybags and it also aims to reduce the use of virgin plastic. Adidas is on a good way to meet its goal of transition to the use of 100% recycled low-density polyethylene (hereinafter »LDPE«) polybags by 2021 which have lower environmental footprint than conventional bags and most other alternatives as well (Adidas, 2021a).

3.2.4 Decarbonised retail operations

Around 52 million tons of GHG emissions reduction could be done through decarbonised retail operations. The amount of the reduced GHG emissions assumes a significant reduction in energy consumption – more specifically a 40% reduction. This could be achieved by making improvements in heating, ventilation and air conditioning. Even

greater energy efficiency can be achieved by implementing LED lighting together with switching to 100% renewable energy sources across retail operations. An 80% improvement in energy efficiency could be reached by doing the above mentioned (Berg et al., 2020).

H&M's level of renewable electricity in their own operations has been above 90% for the past few years. In fact, 95% or 96% of electricity came from renewable sources in 2017-2019 and 90% of electricity came from renewable sources in 2020 (H&M Group, 2021a).

Primark for instance reports the most significant improvement made by implementing all-LED lighting solutions in their stores. As a consequence, electrical intensities for lighting have reduced by around 50%. Lighting fixtures were also replaced by a highly efficient LED lighting system at the Primark distribution centre. The implementation is expected to reduce energy consumption by approximately 60% (Primark, 2019).

3.2.5 Minimised returns

Minimised returns can also contribute to GHG emissions savings. In fact, they could contribute to approximately 12 million tons of GHG emission reduction, which could be done through reduction of e-commerce returns rate from 35% to 15% and through technological improvements, such as predicting size and fit of the consumer together with consumer behavioural change in terms of purchases that are made with the intention to return the items (Berg et al., 2020).

However, it will be difficult to minimise the returns if companies perceive the great returns policy as the great customer service (Busby, 2019). What is more, McKinsey's research indicated that managing returns is not among top five priorities for a third of retailers as the majority perceives the returns policy as critical to increasing the revenue and agrees that returns are the necessary evil (Ader et al., 2021). Fashion companies are even increasing the returns policy and make it easier for the consumers to return the unwanted garments. Asos for example increased the returns policy in 2019 from 28 to 45 days, but claimed to deactivate the accounts if they suspect that a customer is actually wearing the purchased item and then returning it or ordering and returning the clothes. However, when contacted, Asos reported about only a tiny fraction of accounts being deactivated (Busby, 2019).

According to Forbes (2019), it is estimated that only 50% of returns go back into store inventory. The rest goes back to the manufacturer or is resold to discounters or liquidators. If at any stage of the process of finding a new home or purpose the disposal of garments is considered less expensive, landfill becomes their final destination.

3.2.6 Reduced overproduction

Reducing the overproduction could result in highest savings of GHG emissions. In fact, the emissions could be reduced by approximately 158 million tons in 2030. Currently, around 40% of clothes are currently available in stores at a reduced price. Again, technology improvements which would support demand forecasting and stock management would be the potential contributors to achieve reduced overproduction for the approximate 10-percentage points (Berg et al., 2020).

In order to minimise the production of surplus goods, Inditex for example tries to avoid extensive supply chain and thus organises the supply in the areas that are nearest to their design centres. This way they can better adapt their offering according to the trends or answer any possible shifts in the market and thus adapt their production levels to the actual demand. Responsible stock management was one of the most important aspects of their business model in 2020 (Inditex Group, 2021).

3.2.7 Reused or recycled waste

A lot of waste is produced during company's own processes - logistic centres, factories or at headquarters. Such generated waste can be either thrown away or recycled. Inditex Group for example organised internal collection circuits which enable processing waste by waste managers. Such reorganization enables recycling, recovery and conversion of waste into new materials or inputs which can be then effectively re-used in further processes. In 2020, for example, they managed to reuse or recycle as much as 91% of their in-house used paper, cardboard, wood, plastic, metal and textile scraps. These materials were processed through the mentioned internal collection circuits and enabled the brand to avoid the use of virgin materials. The same percentage of materials was reused or recycled in 2019 and 88% of waste materials was reused/recycled in 2018 (Inditex Group, 2021).

An initiative called T2T programmes (textile to textile) was implemented specifically to recycle post-manufacturing materials which came from different players in the value chain, to boost the scalability of textile recycling in the sector as a whole and move towards a closed-loop business model. Inditex also promotes the use of recycled synthetic fibres in order to encourage the abandonment of virgin materials in production processes among other fashion brands (Inditex Group, 2021).

At H&M, 92% of generated waste in distribution centres was recycled or reused in 2020. Moreover, 64% of H&M stores had implemented some kind of efficient recycling systems in 2020. In that year, H&M also released a second collection which was made of recycled clothes that were previously unsold but re-used in a new collection. Additionally, the brand offers customers to purchase renewed and previously damaged garments as a new collection called "Restore" at COS (brand which is part of the H&M Group) (H&M Group, 2021a).

Primark managed to divert 96% of waste that was generated by their direct operations away from the landfill in 2019. This was the result of their Resource Recovery Units at distribution centres in Czech Republic, Germany, the Netherlands and the UK, where cardboard, plastic and hangers collected all around their European stores are reprocessed and sent for further recycling or energy recovery (Primark, 2019).

Nike was the winner in this field in 2020, as the brand managed to divert 99.9% of manufacturing scraps from landfills – approximately 7% of the waste was recycled through Nike’s closed-loop recycling programmes, 38% was re-made into other brand’s products and 54% went to energy recovery (Nike, Inc., 2021).

3.2.8 Innovative design

H&M and Weekday (Swedish street/fashion clothing brand) released their first denim collections in line with Ellen MacArthur Foundation’s Jeans Redesign guidelines as part of the Make Fashion Circular initiative. These jeans are 100% recyclable and made with safer chemicals, which is more than the initial guidelines prescribe (H&M Group, 2021a). Moreover, a new technology is already in place, and it enables separation and recycling cotton and polyester blends into new fibres without quality being lost. Additionally, it is done on an industrial scale. It is called the “Green Machine” and it is a product of collaboration between H&M Foundation, the Hong Kong Research Institute of Textiles and Apparel, and one of the suppliers (H&M Group, 2021b).

Another planned project of H&M is finding a solution regarding microplastics release during manufacturing. They started a 24-month research where they will monitor the amount of released microplastics in water in factories (H&M Group, 2021a).

Adidas developed several innovative products which were mentioned before and are mostly made of recycled materials. In addition to that, the brand introduced a Futurecraft.Loop performance shoe which is their first 100% recyclable and biofabricated performance shoe. It is made from one material only, using no glue or solvent. In 2020, they continued the journey by launching the Ultraboost DNA Loop shoe. In 2020, only 1,500 pairs were produced as the goal was to get a better insight of possible improvements, but from April 2021 on, the shoes have been available to buy and are truly »made to be remade« as they are made of only one single material and with no glue used, so when worn out, they can be returned and be made into a new product (Adidas, 2021a).

3.3 Use phase

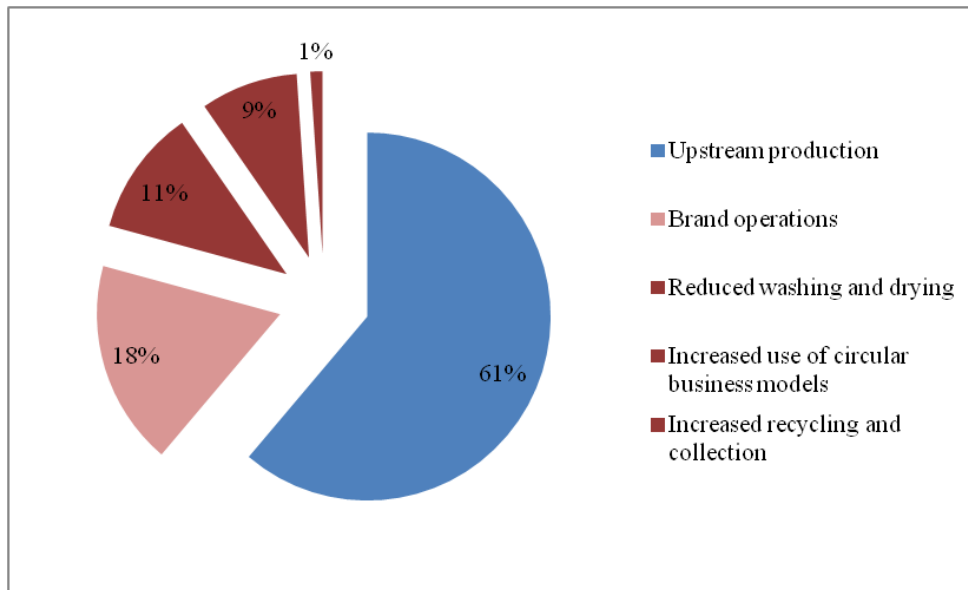
It is not only the fibre or garment production processes but also the use phase of textiles that produces a significant amount of GHG emissions. It is estimated that around 120 million tons of CO₂ equivalent is generated through washing and drying the clothes by

consumers in the use phase. Beside the GHG emissions produced, it is also enormous amounts of water used in the use phase of clothing. It is estimated that global consumers consume around 20 billion cubic meters of water per year just to wash their clothes in washing machines. Additionally, trillions of plastic microfibers are released through washing which mostly end up in the oceans. Polluted oceans are a growing global concern as environmental damage is immense. Beside the fishing nets and plastic waste released in the ocean, it is also the microfibers from the washing of plastic-based textiles, such as polyester, nylon and acrylic that significantly contribute to the current situation. To put it into perspective: every year around 0.5 million tons of plastic microfibers are released into the ocean just by washing the clothes in the washing machine. The number is equivalent to more than 50 billion plastic bottles (Ellen MacArthur Foundation, 2017).

It is not only the environment that consumers should be concerned about when purchasing and taking care of the clothes, but also about themselves. A certain level of chemicals that are used during the production processes is retained in the finished textiles which are then worn by the wearer. Besides releasing the chemicals and microfibers into the oceans when being washed, these can also impact the wearer him/herself by causing allergic reactions or other severe diseases. For example, formaldehyde, a colourless and strong-smelling gas, also used for making building materials, household products, pressed-wood products etc., is used in textile production process to achieve crease-resistant or “non-iron” garments. Formaldehyde has otherwise been recognized as carcinogenic to humans by the International Agency for Research on Cancer and is also known to be linked to allergic contact dermatitis (Ellen MacArthur Foundation, 2017).

By changing consumer behaviour and actions in the apparel-use phase and the end-of-use phase together with conscious consumption and new industry business models, around 21% of accelerated abatement potential could be achieved. This could be done through implementation of closed-loop models, reduced washing and drying and increased collection of garments and further reusing or recycling them (Berg et al., 2020). The red portion of the pie chart in Figure 15 shows emissions savings within usage and end-of-use under accelerated abatement.

Figure 15: Emission savings within usage and end-of-use phase under accelerated abatement (in %)



Source: Berg et al. (2020).

3.3.1 Circular business models

Circular business models can include various different things such as fashion rentals, re-commerce, repair and refurbishment. By implementing these kinds of business models, the industry could cut around 143 million tons of GHG emissions in 2030. Therefore, consumers are crucial in the sustainable transformation of the industry. To put it into perspective, approximately 1 in 5 garments sold must be traded through the circular business model by 2030 in order to achieve the 1.5°C pathway (Berg et al., 2020).

H&M is implementing the circular business model by offering repair services in 8 stores. They also offer customers tips and solutions on how to repair or adjust a piece of clothing and thus extend its functional use, wash and care for products in 46 markets across the globe (comparing to 7 markets in 2019). They also started with rental of products in a few markets through other brands in the H&M Group. If none of reuse options is possible, the garments are then recycled. Only the remaining 3-7% of garments that cannot be reused or recycled are incinerated for energy recovery and are never sent to landfills (H&M Group, 2021a).

In 2019, Primark started an in-store recycling project for their customers in Birmingham where the largest Primark store is situated. The goal of the project was to make Primark stores a collection point for unwanted garments, textile and shoes. The main principles were: as many clothes as possible are collected and re-worn, if clothes cannot be re-worn

they are recycled into yarn, profits of the project go to charities, the model should be simple, flexible and auditable (Primark, 2019).

Moreover, Primark has also donated unsold garments and sample pieces in Europe to the charity Newlife since 2010. Newlife is an organisation that collects, then sorts and further recycles the clothes to raise money to support their work. In the US, Primark partnered up with the organization called Delivering Good to which they donate unsold clothing. Unsold garments are then further redistributed by Delivering Good (Primark, 2019).

Adidas is working on the development of products which could have multiple lifecycles as a true result of the circular business model. Futurecraft.Loop running shoe is an example of such product, but the brand also strives to create products that can have multiple lives and then be returned to nature without any harm (Adidas, 2021c).

3.3.2 Reduced washing and drying

186 million tons of reductions could be made by changing consumer behaviour in the use phase by changing the washing patterns of the consumers who usually tend to wash their clothes too often or washing on the temperatures that are too high. If one in six washing loads was skipped or if half of the loads were washed at the temperature below 30°C, together with practicing open-air drying instead of using the dryer, the mentioned reductions in emissions would be easily attainable. Brands and retailers could stimulate the behaviour by adapting their offer such as giving better care instructions and providing sustainable materials (Berg et al., 2020).

Inditex' brands such as Zara, Pull&Bear, Massimo Dutti and Uterqüe inform their customers of proper care of the clothing by publishing specific clothing care guides on their websites in order to maintain garment quality and extend their useful life (Inditex Group, 2021).

H&M also offers laundry bags which capture the microfibers before they enter the water system. However, they are searching for new solutions rather than only relying on laundry bags as a long-term solution (H&M Group, 2021a).

3.3.3 Increased recycling and collection

Emissions reductions per year of around 18 million tons could be achieved by increased recycling and collection of used garments. This would reduce the amount of incinerated clothing and landfilled clothing and thus move the industry toward a closed-loop recycling model. At the moment, less than 1% of clothes are recycled back into the fashion industry's value chain. In order to achieve accelerated abatement, it is necessary to make some advancement in chemical textile-to-textile recycling and to make improvements in sorting and textile blend identification technologies. It is also absolutely necessary for the

brands to show higher incentives for the closed-loop recycling model and for the consumers to support this adoption (Berg et al., 2020).

Closing the loop is of course impossible if consumers do not have a channel through which they could give or collect the used garments. For this purpose, Inditex Group ensured that in 2020 100% of their stores would have a collection container for used clothing and shoes, with the aim to prevent the garments to end up in landfills. The Group has also put the clothing collection service online, but the service is currently only available in Spain, some cities in China, Paris, London and New York. The collected items are either donated to non-profit organizations which sort them for the best possible use or are repaired, recycled or sold to finance the social projects of these non-profit organisations (Inditex Group, 2021).

4 SUMMARY OF SUSTAINABLE PRACTICES INTRODUCED BY FASHION BRANDS

Based on the presented sustainable practices implemented by different fashion brands, one could get the impression that all analysed brands are true examples of sustainable fashion companies. It must be kept in mind that such information, published directly by the companies themselves, can be biased and should therefore be interpreted with a certain degree of doubt. As presented in Figures 2 and 3, Primark, H&M, Zara, Adidas and Nike are all multi-billion companies. This would not be the case if they were not profit-oriented and tried to minimise the costs wherever possible. This leads to a question of how they manage to offer not only their regular collections but also sustainable lines of clothing at such low prices despite their increased investments in more sustainable material sourcing, more sustainable transportation or any other novelties.

In order to ensure a clearer overview and a better understanding of sustainable practices introduced by different fast fashion brands which were presented in the previous chapter based on companies' or groups' impact reports, sustainability reports and annual reports, a summary is done in Table 3. A given "x" indicates that a certain sustainable practice has been implemented within the brand.

Table 3: A summary of sustainable practices introduced by fast fashion brands

	Primark	H&M	Inditex group/Zara	Nike	Adidas
Disclosure of environmental data related to SC in China (through IPE)	x	x	x	x	x
Improved material mix/Innovative material sourcing		x	x	x	x
Use of sustainable cotton (organic/ recycled/sourced through BCI or similar initiatives)	x	x	x	x	x
Disclosure of suppliers (transparency)	x	x		x	x
Improving energy efficiency	x	x	x	x	x
Adoption of RSLs or MRSLs to achieve ZDHC	x	x	x	x	x
Improved transportation/Adoption of more sustainable transport	x	x	x	x	x
Improved packaging	x	x	x		x
Minimising the returns					
Reducing overproduction			x		
Reducing/recycling the waste	x	x	x	x	x
Educating consumers regarding correct washing and drying		x	x		
Collecting and recycling of used clothing (moving towards circular business model)	x	x	x		x

Source: Own work.

Regarding the questionable level of transparency of multimillion fashion brands and their sustainable practices, Marriott (2021) published an article in the Guardian newspaper to answer that question and to reveal the true cost of Zara's black top from Join Life sustainability collection. What researchers found is that EUR 10.26 out of the total price of EUR 26.66 went directly back to Zara to cover retail space and staff wages. The value added tax amounted to EUR 4.44; EUR 4.20 was the profit of Zara and only EUR 1.53 went to the textile factory in Izmir, Turkey (where cutting, sewing, packing and attaching the labels on the garment is performed), from which EUR 1.10 went to the garment worker for a 30-minute job of putting the top together. This suggests that there is nothing like a minimum gross hourly wage which, at the time of a research, is supposed to amount to EUR 6.19. The research shows that low prices of fast fashion brands' sustainable collections still come at a certain cost which is usually born by the most vulnerable in the value chain.

However, fast fashion brands might be facing the biggest challenge of all time as consumer behaviour and preferences changed drastically during Covid-19 pandemic. In addition to uncertainty and financial losses the companies have been facing since spring 2020, environmental aspect will urgently have to be addressed in the nearest future. According to the survey conducted by Granskog et al. (2020), two thirds of surveyed respondents have stated recently that it has become even of greater importance to limit the impacts on climate change. Moreover, 88% of respondents believe that the issue of reducing the pollution should be given more attention. The statements are supported with the numbers as well as 57% of respondents have made significant changes to their lifestyle to decrease their environmental impact and more than 60% report that they changed their usual behavior and patterns to recycle and purchase products in a more sustainable packaging.

The above is supported by the KPMG research which greatly emphasizes the importance of Generation Z' purchasing preferences and their purchasing power. Generation Z is the first digitally native generation which is, among others, highly concerned about the environment. 61% are concerned about the climate change and 56% worry about natural disasters, which is greater than in any other generation. They connect with business for which they believe defends their values. Fashion brands should take this very seriously in order to preserve their business in the future, especially when taking into account that Generation Z represents 40% of world's consumers. Their global buying power amounts to \$150 billion and influences \$600 billion of consumer spending (KPMG International Global Customer Insights, 2021).

The next few years will be crucial for the fashion industry as for many other industries as well. The survival of the biggest companies will greatly depend on their ability to adapt to new consumer preferences and perhaps even lack of resources as we know them today.

CONCLUSION

As seen in the first part of this master thesis, today's fashion can be characterized by mass production where mass customization is perfectly feasible and where global supply chains enable constant production and distribution. Despite the fact that fashion has remained a craft-based business until today, the disruptive fast fashion model has managed to change the rules of the game completely.

Nike, Gucci, Louis Vuitton, Adidas, Chanel, Zara, Uniqlo, H&M etc. are some of the biggest fashion brands worldwide. As presented in the figures in Chapter 1, Nike is the highest-ranking fashion brand in the world with a brand value of approximately \$30.44 billion in 2021. As many other industries, fashion industry also suffered the consequences of the Covid-19 pandemic; however, the industry is expected to recover and continue to grow in the coming years.

When going clothing shopping as consumers, we are mostly surrounded by fast fashion brands which develop their marketing, pricing and advertising strategies toward triggering consumers' shopping impulses. Their business models are based on mass production of cheap and disposable clothing, the main goal of which is lowering the prices of garments to a certain threshold where buying on impulse becomes low-risk. As mentioned, their sourcing and manufacturing processes are often performed in developing countries which lead to extensive supply chains that are hard to track. Overproduction causes huge waste problems as unsold items often end up in landfills or are discarded improperly.

Environmental degradation due to excessive waste and toxic chemicals together with poor working conditions in terms of child labour, low wages and destructive working environments are only some of the downsides of a successful fashion story. As presented in this master thesis, the global fashion industry produced 2.1 billion tons of GHG emissions in 2018 which represents 4% of the global total GHG emissions. The number is equivalent to the annual GHG emissions of France, Germany and United Kingdom combined. This is why fast fashion brands are working hard to tackle environmental and social issues and to communicate their efforts to consumers through different marketing channels.

Practices on different levels of value chain are being tackled and revised – from changing the way materials are sourced to enabling customers to return worn-out clothes. In the past few years, fast fashion brands have started to fully disclose their lists of suppliers and are aiming toward complete transparency. They have been adopting restricted substances lists, improving energy efficiency and transport, and supporting different initiatives that aim to improve the lives of communities in most rural areas of the world where raw materials are produced. Moreover, the number of innovations in different areas has skyrocketed as brands are trying to improve products as well as their overall service to make them more environmentally friendly. Collaborations between global brands and small startups,

businesses, NGOs etc. are becoming a common practice as they proved to be very effective.

However, despite enormous efforts fashion brands are putting into revising their business models as well as into communicating their sustainable actions to the wider public, the question of how much is true and what is hidden from the public eye remains unanswered. At the end of the day, brands such as Nike, Adidas and Zara are worth billions of euros because they are profit-oriented and it is difficult to believe they would want to lose their position in the market to follow their sustainability path. As long as their business models remain to be based on mass production and mass consumption, the needed change cannot be achieved. Only slow fashion and change of shopping patterns can be the answer to environmental degradation and destruction.

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APPENDIX

Appendix 1: Povzetek (Summary in Slovene language)

Kot je predstavljeno v prvem delu te magistrske naloge, je za današnjo modno industrijo značilna masovna proizvodnja, v kateri je množično prilagajanje izdelkov povsem izvedljivo in kjer globalne dobavne verige omogočajo stalno proizvodnjo in distribucijo izdelkov. Kljub temu da je moda ostala obrtni posel vse do danes, pa so se zaradi hitre mode pravila igre povsem spremenila.

Nike, Gucci, Louis Vuitton, Adidas, Chanel, Zara, Uniqlo, H&M itd. so le nekatere izmed navečjih modnih znamk na svetu. Kot je prikazano na slikah v prvem poglavju, je v letu 2021 Nike najvišje uvrščena modna znamka na svetu z vrednostjo kar 30,44 milijard ameriških dolarjev. Kot številne druge industrije je tudi modna industrija utrpela precejšnje negativne posledice koronavirusne bolezni (Covid-19). Ne glede na to pa je v prihajajočih letih predvideno okrevanje in nadaljnja rast industrije.

Kot potrošniki smo večinoma obkroženimi z blagovnimi znamkami, ki so del hitre mode. Poslovni modeli tovrstnih znamk temeljijo na množični proizvodnji poceni oblačil za enkratno uporabo, glavni cilj pa je zniževanje cen oblačil do točke, kjer impulzivni nakup izdelka ne predstavlja več tveganja. Postopki pridobivanja materialov in proizvodnje oblačil se, kot že omenjeno, pogosto izvajajo v državah v razvoju, kar posledično vodi v obsežne in razvejane dobavne verige, ki jih je težko nadzorovati. Prekomerna proizvodnja vodi v težave z odpadki, saj neprodani izdelki pogosto končajo na odlagališčih ali pa so neustrezno zavrženi.

Uničevanje okolja zaradi prevelikega obsega odpadkov in strupenih kemikalij ter slabi delovni pogoji, kot so npr. otroško delo, nizka plačila za delo in uničujoče delovno okolje, so le nekatere temne strani sicer uspešne poslovne zgodbe v modni industriji. Kot je predstavljeno v tej magistrski nalogi, je svetovna modna industrija v letu 2018 proizvedla 2,1 milijarde ton emisij toplogrednih plinov, kar predstavlja 4% svetovnih emisij toplogrednih plinov. Količina je enaka letnim emisijam toplogrednih plinov Francije, Nemčije in Združenega kraljestva skupaj. Družbe, katerih poslovni model temelji na hitri modi, zato ogromno vlagajo v reševanje okoljskih in družbenih vprašanj, kot tudi v oglaševanje in sporočanje svojih prizadevanj potrošnikom skozi različne trženjske kanale.

Družbe prilagajajo in spreminjajo obstoječe poslovne prakse na različnih ravneh vrednostne verige – od pridobivanja materialov pa vse do omogočanja kupcem vračila ponošenih oblačil. V zadnjih nekaj letih so začele družbe tudi javno razkrivati in objavljati sezname svojih dobaviteljev, in sicer z namenom postati čim bolj transparentni. Družbe so sprejele tudi sezname s prepovedanimi snovmi za uporabo, nenehno izboljšujejo energetska učinkovitost in transport, poleg tega pa vlagajo v podporo različnih pobud, katerih cilj je izboljšati življenje skupnosti v najbolj odročnih delih sveta, kjer se proizvajajo surovine. Z namenom postati okolju prijaznejši se je število inovacij na različnih področjih močno povečalo, saj si blagovne znamke prizadevajo izboljšati izdelke

in celotno storitev oz. izkušnjo. Sodelovanje med svetovnimi blagovnimi znamkami in malimi zagonskimi podjetji, nevladnimi organizacijami itd. postaja običajna praksa, saj so se ta izkazala za zelo učinkovita.

Kljub ogromnim naporom, ki jih družbe v modni industriji vlagajo v izboljšanje poslovnih modelov in v ozaveščanje širše javnosti glede svojih vlaganj v zmanjšanje negativnega vpliva na okolje, vprašanje, koliko je res in kaj je skrito očem javnosti, ostaja neodgovorjeno. Konec koncev so blagovne znamke, kot so Nike, Adidas in Zara, vredne milijarde evrov zato, ker je cilj njihovega poslovanja dobiček in težko je verjeti, da bi želele izgubiti svoj položaj na trgu, da bi postale izključno trajnostne. Dokler bodo njihovi poslovni modeli temeljili na množični proizvodnji in množičnem nakupovanju, potrebne spremembe ne bo mogoče doseči. Le počasna moda in spreminjanje vzorcev nakupovanja sta lahko odgovor na težavo uničevanja okolja.