COVID-19 and Sustainability in Textile, Apparel and Fashion Use: An Assessment of Trends

Abstract

Apart from the many social and health problems it has caused, the COVID-19 pandemic has had a severe impact in most sectors of the economy worldwide. One of the areas where such impact is noticeable is the textile, apparel, and fashion (TAF) industry. The lockdowns and limited access to retailer outlets resulted in a considerable drop in consumption, creating problems related to the excess of stocks, the decrease of sales and the disposal of non-used items. This paper outlines the implications of the COVID-19 on the TAF sectors and the European retailers. It analyses how the current supply chains exacerbated stock control problems, and it reports on the changes in consumption during the pandemic. The worldwide restrictive measures implemented to cope with the COVID-19 pandemic were responsible for significant profit losses. Also, the decrease in consumption, caused by several geographically wide lockdowns, prompted a subsequent reduction in orders and sales, resulting in a significant number of constraints. The implementation of more environmentally friendly processes, including sustainable circularity as a competitiveness source to keep TAF in the loop and reduce greenhouse gas (GHG) emissions, may help address the problems associated with the COVID-19 pandemic in the sustainability context, as reported in this paper.

Keywords: Sustainability, COVID-19, Textile, Apparel, Fashion, Supply chains, Trend assessment.

Highlights

- The COVID-19 pandemic has had a severe impact on the textile, apparel, and fashion sectors
- Reductions in consumption created problems related to the excess of stocks;
- Stock control problems were exacerbated by the current supply chain´s constraints
- Measures need to be addressed via which unsold textiles may be more sustainably used

1. Introduction: COVID-19 and change in lifestyle

The lockdowns and restrictions imposed during the COVID-19 pandemic had a significant impact on a variety of textile, apparel and fashion (TAF) sectors and lifestyles, most notably due to the resulting decline in the global consumption of goods and services.[1] In a study carried out in China over 214 cities, it was found that daily offline consumption decreased by 42% during the early stages of the lockdowns. The purchase of goods and services was decreased by 44% and 43%, and entertainment/dining and travels had greater decreases of 72% and 64%, respectively. The consumption decreases per city ranged from 14-69%, indicating that measures implemented during the pandemic led to a significant reduction in consumer activity and thus a significant influence on the economy.[1] When considering household consumption and poverty, it was concluded that the decrease in global household consumption matched an increase in poverty, with recovery time for households estimated at one year.[2] This was causally related to another impact brought about by

the pandemic, which was the need for food storage, economic strategy and reuse of leftovers.[3]

According to Hall el al.[4] and Chenarides et al.[5], the pandemic caused a change in the displacement of consumption. This was related to: spatial issues such as where consumption occurs, being influenced by the limitation of the displacement; the temporal aspect of consumption, born of the fear that certain types of products such as hygiene products would be in short supply, causing people to buy a high number of products for storage; and physical restrictions impacting on the means through which people purchased a product and consumption occurred. Concerning the offer of products, the limits to mobility, restrictions at the borders, the blocking of employees and the high rates of dismissal all contributed to the workforce becoming increasingly reduced. Constant interruptions regarding the supply of the most varied types of products also caused limitation in the availability of products.[6, 7]

Restrictions and fear brought about considerable lifestyle changes in the way people socialise and eat. In Italy, for example, it was estimated that in a population where approximately 60% had dinner in restaurants at least once a week, and 10% ate breakfast every day outside, this reality was altered during COVID-19, causing the population to increase purchases made in supermarkets.[8] According to Rodrigues et al.[9], the quality of the population's diet, where consumption of processed foods and fast food increased considerably, was due to two factors. The first was that people spent more time using electronics such as cell phones and televisions that advertise this type of food, and the second factor was the panic to buy food with a longer shelf life.[10] In terms of the tourism sector, the consequences caused by COVID-19 - with the introduction of restrictions on the circulation of people - severely damaged India's economy, with a 25% reduction of international travel in the country in the first half of the pandemic.[11]

More specifically in India, the consumption of people in urban areas were more affected than those in rural areas. This is likely attributed to urban people living more upmarket lifestyles than people in rural areas[12]. This was further supported by a study in Singapore that showed a reduction in the consumption of those with a higher net worth. It was found that the pandemic reduced consumption by 22.8%, which is comparable to values in China[13]. In Europe, similar trends were observed with significant decreases in non-durable consumption. This was attributed to consumers fearing the financial uncertainty of the pandemic. Moreover, it was found that financial concerns fuelled a negative consumption rate during a negative income shock for many consumers[14].

In terms of energy consumption, in the case of Pakistan the pandemic caused a significant reduction in energy consumption and, consequently, in CO_2 emissions in the oil consumption, due to the low number of vehicles in circulation, and a reduction in the levels of greenhouse gas (GHG) emissions, which helped the government to structure more sustainable public policy plans for energy consumption.[15] In the case of India, social isolation and blocking measures significantly reduced energy consumption. This reduction in consumption corresponded to about 9.24% in March, 22.75% in April and 14.16% in May 2020. The International Energy Agency showed that despite the increase of energy consumption in homes, this value was still much

lower than the percentage of energy use that was reduced by the industries prevented from functioning.[16] Relating to private consumption, it was found that consumer demand declined as the pandemic progressed. Despite lockdowns and restrictions being eased over time, consumer behaviour was altered, which caused consumption to remain at negative values. Furthermore, it was highlighted that most planned purchases, such as automobiles and real estate, were cancelled, which affected global consumption rates. However, it can be emphasised that e-commerce was the most resilient to the effects of COVID-19. Accordingly, it would be wise to encourage the development of this sector as a method to increase consumption.[17]

2. COVID-19 and the Textile, Apparel and Fashion Industries

This paper reviews the impact of the Covid-19 pandemic on the TAF industries.[18] The textile and apparel industry can be divided into two major segments: the production of textiles and fabric from raw materials and the manufacturing of these fabrics into clothing and accessories. On the other hand, the fashion industry is here defined as a commercial industry engaged in the production, manufacturing, and selling of material commodities through distribution and retail channels, such as stores, department stores, and other commercial outlets like e-commerce platforms.[19]

The fashion terms are used in the broad sense to provide an overview of the recent trends originating from, but not exclusive to, the COVID-19 pandemic.

It is well-known that COVID-19 has resulted in a global pandemic with more than 500 million reported cases worldwide and over 6 million deaths[20, 21], representing an unprecedented global crisis. China, India and Bangladesh are examples of countries with a strong textile industry presence, where workers remained without work after employers closed the doors of the production facilities and dormitories,[22-25] thus revealing the weakest link of the global value chains. By March 2020, approximately USD 2.8 billion in order cancellations from Western brands were reported from Bangladeshi suppliers.[26] This caused an impact on the livelihood of 1.2 million workers, causing 9% of apparel factories to permanently shut down their business by August 2020.[27]

As in other industries, the pandemic has exposed fractures and conflicts that have existed in the global fashion supply chain for a long time. The unfair working conditions, uneven distribution of profits and the disregard for the environment have all resulted in an industry that has done little to inspire faith in its operational intelligence. In its quest to grow and generate profits, the textile and apparel industries combined have created a ticking time bomb, the effects of which have been felt and manifested globally. Within this context, it is not surprising that the COVID-19 pandemic has affected this industry and is threatening its collapse. In fact, the industry was in trouble before the pandemic, and key critical questions were being asked of it. Fashion had become its own virus as it polluted the planet with its lure of identity freedom, planned obsolescence and growth at all costs, and resistance to these forced models has come from many quarters. Consequently, the TAF industries have been radically shaped by the COVID-19 pandemic. As a result, and as reported by Barcaccia et al.,[28], most sectors of economic activity recorded downturns in terms never registered before, also with particular emphasis in the textile, apparel, leather and accessories sectors, in

many cases due to the discontinued exportation or cessation of production [25, 29, 30] and leading to a permanent loss of the workforce in the textile industry.[24, 25]

Retailers, who had already been responding to trends in experiential retail, are currently imagining how concerns for wellbeing, the environment and consumption can be combined. A glance through retail industry predictions for the future highlights how targeting the future consumer will be based upon ethical, empathetic and inclusive practices.[31] A value shift is occurring, in many cases coming from the youth of today, who are being galvanised by global concerns and are joined together by advances in worldwide global communication.[32] This will bring fresh voices to the discussion of strategies to be used in times of pandemic crisis, particularly in what concerns the role of retailers in the textile industry,[33] which seems to be significantly affected by restrictions imposed through lockdowns. The lockdowns prevented most retailers from operating normally, and the impact was severely felt across the TAF industries.

This COVID-19 pandemic has resulted in significant changes in consumer preferences through e-commerce. Although varying from country to country, e-commerce emerged as an opportunity to develop digital tools in the textile industry[29] and combine them with a renewed sense of traditional and community-based practices. This includes strategies to elevate the essential worker economy and direct to customer/direct to investor techniques with a focus on transcultural products and activism. The Omni channel will become omni-interaction with e-interactive commerce, virtual gifts and 'on the road retailing'.[31] This pandemic also resulted in a wake-up call to align people towards economic and environmental sustainability.[34] As highlighted by Paço et al.,[35] people are more conscious of environmental issues today, also regarding textiles, opting for re-use. Furthermore, many consumers have shifted to online shopping, leaving many brick and mortar retailers struggling for survival. As a consequence, retailers and fashion brands are looking to reinvent themselves by considering strategies that are more sustainably driven and agile.[36] India is an example of surprising transformations during critical times, with personal protective equipment and hospital furnishing products being made by the textile and fashion industry, a serious example of adaptation.[30]

The impacts of the pandemic are particularly conspicuous in the 10 major textile-producing nations in Asia, i.e., Bangladesh, Cambodia, China, India, Indonesia, Myanmar, Pakistan, Philippines, Sri Lanka and Vietnam, which heavily depend on the industry, which has led to a set of negative outcomes as summarised in Figure 1. Similar problems are also seen worldwide.

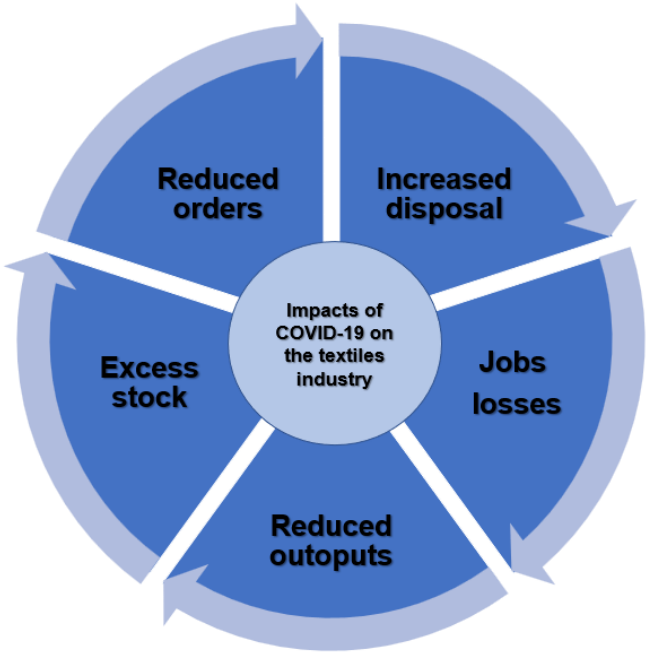

Figure 1- Some of the impacts of the COVID-19 pandemic to textile nations in Asia.
Source: authors

Looking forward, in 2021 the fashion industry is expected to be severely impacted by decreasing sales, shifting consumer behaviour patterns, unwanted inventory and disrupted supply chains. In an industry where the signs of resilience are fading, fashion brands are increasingly committing to sustainability as a means to recover from the crisis. Revenues, however, are not expected to reach 2019 levels until the third quarter of 2022, and the state of recovery will vary across different fashion categories, value segments and geographical markets.[27]

3. Methods

The TAF industries have been radically shaped by the COVID-19 pandemic. Assessing the consequences of the pandemic on this very specific industry is necessary, since it has wide implications at the global level. For instance, sustainability in the TAF industries has been a critical element to encourage more socially and environmentally friendly processes in the sourcing, production, marketing, and selling of fashion products.

To address this need, a literature review was carried out with the aim to assess the implications of the pandemic on consumers' lifestyle changes as well as on the TAF industries, including retail. Relevant secondary data from available reports and websites were collected, and a diversity of official statistical information was used. This process allowed the authors to collect recent information on COVID-19 and to analyse its impacts, while addressing the performance of the TAF industries during the COVID-19 pandemic period.

Sources for facts and figures on the TAF industries during the pandemic are presented below, which allow one to monitor the situation experienced by the industries while simultaneously describing consumer behaviour changes during this period. Circularity challenges and opportunities are also highlighted, aiming to identify the main strategies implemented by companies to step out of the crisis. Table 1

presents the most import sources of data relating to the TAF industries in the COVID-19 pandemic context.

4. Results and discussion

4.1. The Effects of COVID-19 on the Textile, Apparel and Fashion Industries – some facts and figures

According to the 'State of Fashion 2021' report by the Business of Fashion (BoF) and McKinsey & Company,[27] the COVID-19 pandemic and the worldwide lockdown measures led to a collapse of the global economy and the fashion industry in 2020. Compared to 2019 levels, fashion companies' sales dropped 15-30% in 2020 and economic profits fell by an appalling 90%, following a 4% increase in the previous year. [27] The apparel industry was the most affected by the pandemic, with approximately 86% of the businesses witnessing a drop in orders.[37] In Europe alone, production in the textile sector decreased by 26.9% in April-June 2020, when compared to the same period in 2019.[38] In contrast, Extra – EU 27 imports of textile and apparel goods saw a prompt increase of 154.2%, likely from PPE being extensively procured during the peak of the pandemic in Europe. Also, many consumers shifted to online shopping, leaving many brick and mortar retailers struggling for survival. Despite the COVID-19 pandemic, and because sustainability is critical for business, the TAF industries have moved forward to improve performance and implement sustainability (Figure 2) by applying alternatives, such as the ones illustrated in Figure 3, which can be measured and implemented.

The engagement in circular economy models to keep the textiles and apparel sector in the loop with GHG emission reduction commitments is part of the recovery strategies witnessed by TAF companies.[39, 40] Some of those efforts are presented in Figure 4, clearly showing the role played by the circular economy in the survival of this industry. Whether these efforts are enough to make ends meet is questionable, with industry observers suggesting that the only viable solution to an industry that is hurting socially and economically is to scale circularity.[41]

The effects of the pandemic highlighted the fashion industry's problem with over-production to meet the demands of pre-pandemic consumers who were accustomed and willing to pay for the latest fashion collections at low prices, mostly offered by fast-fashion brands.[42] However, excess inventory and extensive markdowns prior to the COVID-19 pandemic were already contributing to the industry's over-stock problem, with just 60% of the garments being sold at full price.[40] The resulting billions of dollars of lost revenues and margins only worsened with the pandemic. According to the BoF and McKinsey & Company report,[27] inventory turnover fell by 33% in the first trimester of 2020, and orders decreased by a third year-on-year at the end of April 2020. By trying to balance production capacities that are demand-focused and keep a strategic alignment with key suppliers, many brands have left the supply chain under pressure. That is, fashion cycles are becoming larger and with less product assortments, leaving many suppliers in a risky situation.[43]

Table 1 — Official sources of the Textile, Apparel and Fashion industries information during the COVID-19 pandemic

Source	Topic	URL
Business of Fashion (BoF)	Fashion news, analysis and commentary, sustainability	https://www.businessoffashion.com/
Boston Consulting Group (BCG)	Business strategy consultants, producing report: "Fashion´s Big Reset"	https://www.bcg.com/en-gb/publications/2020/fashion-industry-reset-covid
Business Wire	Business information	https://www.businesswire.com/
Danish Environmental Protection Agency	Environmental protection, publishers of the report: "Towards 2025"	Report: https://www2.mst.dk/Udgiv/publications/2020/06/978-87-7038-202-1.pdf
European Center for Constitutional and Human Rights (ECCHR)	Providing legal interventions to counter injustices	Report on how the COVID-19 pandemic has affected suppliers and workers: https://www.ecchr.eu/fileadmin/ECCHR_PP_FARCE_MAJEURE.pdf
Ellen MacArthur Foundation	Circular Economy thinktank	Report on redesigning fashion's future: https://www.ellenmacarthurfoundation.org/publications/a-new-textiles-economy-redesigning-fashions-future Report on the circular economy and a Covid-19 recovery strategy: https://www.ellenmacarthurfoundation.org/publications/covid-19
Euratex	Organisation representing the European textile and clothing industry	Report: https://euratex.eu/news/euratex-presents-its-recovery-strategy/
Eurostat	Key statistics on European businesses	https://ec.europa.eu/eurostat/documents/3217494/12601271/KS-01-20-363-EN-N.pdf/57086a1d-ba26-a397-85b6-f28d08f28426?t=1616747084138
Fashion United	Fashion news	https://fashionunited.com/ Lost jobs: https://fashionunited.com/news/business/2-1-million-retail-jobs-lost-from-impact-of-coronavirus/2020050833478
Financial Times (FT)	Economic news	https://www.ft.com/ Italy's artisan luxury suppliers: https://www.ft.com/content/cd276ecb-8d64-4aff-9ead-26c8b8febb1b

Source	Topic	URL
Global Data (incorporating Just-Style)	Statistical data, analysis and news from the textile sector	https://www.just-style.com/
McKinsey & Company	'The state of fashion' reports Fashion on climate Sustainability in fashion	https://www.mckinsey.com/ Fashion on climate: https://www.mckinsey.com/industries/retail/our-insights/fashion-on-climate Fashion consumers: https://www.mckinsey.com/industries/retail/our-insights/survey-consumer-sentiment-on-sustainability-in-fashion
ReportLinker	Market intelligence	https://www.reportlinker.com/market-report/Textile/509048/Textile?gclid=Cj0KCQjwmIuDBhDXARIsAFITC_47AbgFY_bA5Ju42IIBcmmnSflQBCglgubn6mO_hzZBJI25kWkS11IaAh-AEALw_wcB
Research & Markets	Market intelligence	https://www.researchandmarkets.com/reports/5212359/textile-and-apparel-trade-and-production-trends
Reuters	Global news Clothes recycling Retailer's supply chains	https://www.reuters.com/ Recycling: https://cn.reuters.com/article/health-coronavirus-textiles-recycling-idUSL8N2G72J4 Cancelled orders: https://www.reuters.com/article/us-health-coronavirus-global-fashion-ana-idUSKBN22C01J
Statista	Statistics on apparel and textiles in Europe	https://www.statista.com/study/75595/coronavirus-impact-on-apparel-and-textile-industry-in-europe/
UK Fashion and Textiles Network (UKFT)	UK Fashion and Textiles	https://www.ukft.org/coronavirus/
United Nations Conference on Trade and Development {UNCTAD)	UN support for developing countries	https://unctad.org/news/textile-and-garment-supply-chains-times-covid-19-challenges-developing-countries
Wall Street Journal	News and comment Retail and unsold clothes	Unsold clothes: https://www.wsj.com/articles/fashions-big-question-what-to-do-with-all-those-unsold-clothes-11597328695.

Source	Topic	URL
Eionet	Plastic in textiles: potentials for circularity and reduced environmental and climate impacts	https://www.eionet.europa.eu/etcs/etc-wmge/products/plastic-in-textiles-potentials-for-circularity-and-reduced-environmental-and-climate-impacts/@@download/file/ETC_2.1.2.2._plastic%20in%20textiles_final_edited%20for%20website.pdf
Expert Network on Textile Recycling (ENTeR)	Approach Validation	https://www.interreg-central.eu/Content.Node/D.T3.3.1-Working-Progress-Report—11.pdf

Source: authors

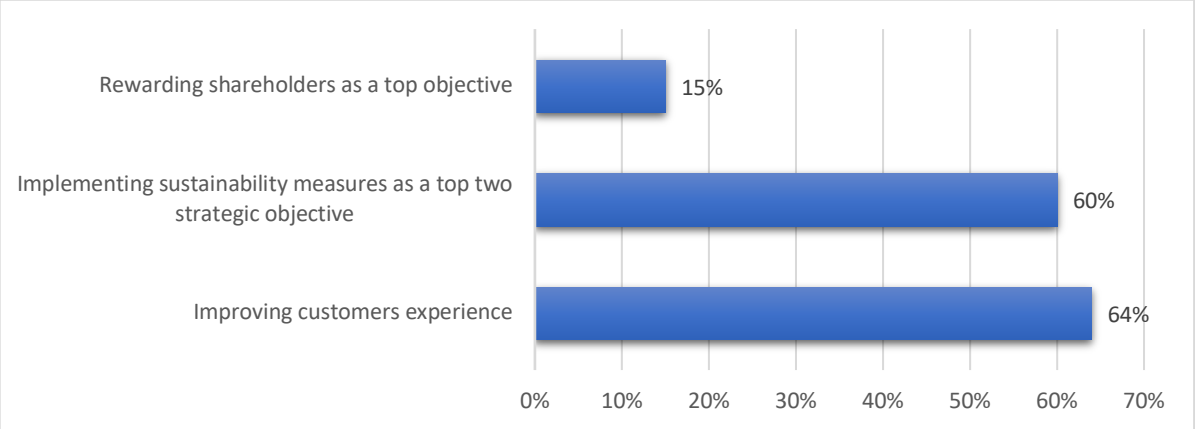

Figure 2. Some of the measures taken to by the fashion sector to improve sustainability performance.

Source: authors, based on information provided by BusinessWire [44]

Early in 2020, artisanal goods from Italian manufacturers dropped around 40% (Financial Times,[45] cited in BoF and McKinsey & Company,[27]), and in Central American countries such as El Salvador and Honduras, the apparel exports to the US fell by 90% year-on-year in April 2020 (JUST-STYLE,[46] cited in BoF and McKinsey & Company,[27]). The strategic move by fashion brands to reverse the negative effects of excess inventory, markdowns and price reductions is also aligned with a shift in consumption behaviours that adopt a 'less is more' approach.[27, 40]

4.2 Examples of Fashion Retail brands and Inventory increases during 2020

The TAF supply chain is characterised by numerous time-consuming operations. The main processes are fibre production, spinning, fabric manufacture, dyeing and finishing, apparel manufacture, and culminating in retail and consumer purchasing. All these processes are time-consuming (measured in weeks), and it is usual to have inventory buffers between them. The past two decades have witnessed many initiatives to reduce both inventory levels and processing times. However, in order to manage the costs, most retailers and brands plan their product ranges using forecasts, rather than making to demand. The supply chains must find a balance that considers keeping inventory levels low and product lead times short, while at the same time keeping costs low whilst meeting delivery targets. The risks involved are discussed by McMaster et al.,[47] pointing out that lean manufacturing has high menaces, and that what is needed is greater flexibility. The concept of agile manufacturing is considered, although this is linked to higher levels of inventory. The supply chain strategies of Fast fashion and Ultra-Fast fashion retailers are considered

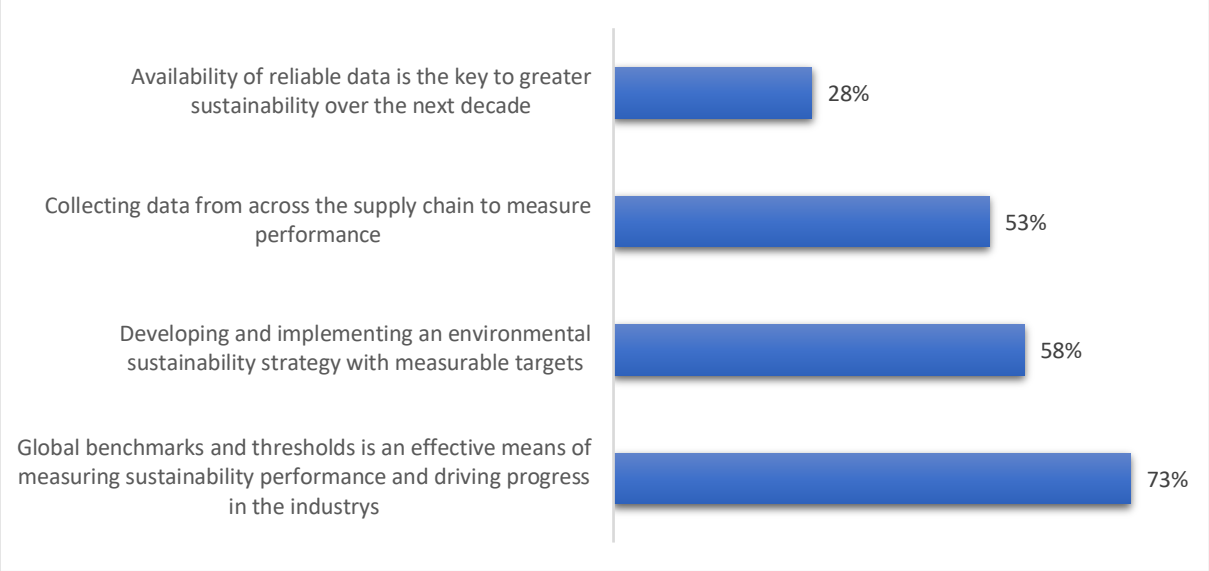

Figure 3. Fashion, retail and textile leaders' measures to implement sustainability despite the COVID-19 pandemic

Source: authors, based on information provided by BusinessWire [44]

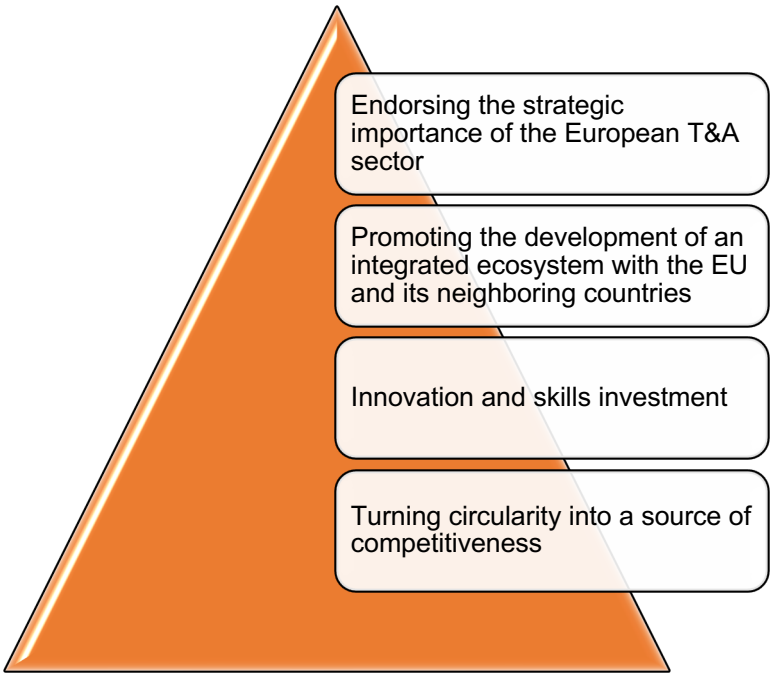

Figure 4. Post-COVID recovery proposals for the European (EU) textile and apparel (T&A) industry

Source: authors, based on information provided by The European Apparel and Textile Confederation (EURATEX) [48]

by Camargo et al.[49] Fast fashion uses mass production techniques in low-labour cost countries to achieve price-points, whereas Ultra-fast fashion has a stronger emphasis on demand-led production from near-sourcing suppliers. This section considers three leading retail businesses and how their business models have fared during the COVID-19 Pandemic.

The largest current apparel retailer is Zara, the dominant member of the Inditex family of companies. This Spanish business started in manufacturing, and then switched from supplying retail brands to making and selling its own brand products. The manufacturing expertise has not been dropped and is a significant part of Zara's success. The company has adopted a balanced sourcing approach, where domestic suppliers manufacture small batches of fashion products and larger batches are sourced globally, often in the Far East. The main market for these fashion garments has been Europe, but Zara has rapidly developed as a global brand.

The effects of the Pandemic were beginning to be felt in February 2020, but by mid-March there were lockdowns in many European countries. By then, Inditex had closed 3,785 of its stores across 39 markets. First quarter financial data reveals the impact on the company.[50]

Figure 5 shows that net sales of €3.3 billion were recorded in 2020. However, compared to the 2019 period, it shows a drop of around €2.6 billion. The gross profit was almost halved, and the company was trading at a loss. Obviously, the biggest contributor was the drop in sales. However, other factors were involved, linked to shop closures, existing commitments with suppliers and the cancellation of goods in the supply pipeline that could not be sold. According to JUST-STYLE,[51] this inventory charge for the first quarter was €287 million. The inventory valuation dated 31 January 2021 was €2,321 million, representing 8.8% of total assets.

As shown in Table 2, these assets are mainly finished inventories, and the auditors were charged with assigning a value to these inventories. The directors' report explains that 'estimates of net realisable value are used, based on assumptions linked primarily to the success of collections'.[52] Despite the COVID-19 pandemic, these stock valuations are close to those of the previous year, suggesting that stock levels were under control.

Looking at figures for the whole year, net income fell (year-on-year) to €1.1bn and net sales fell

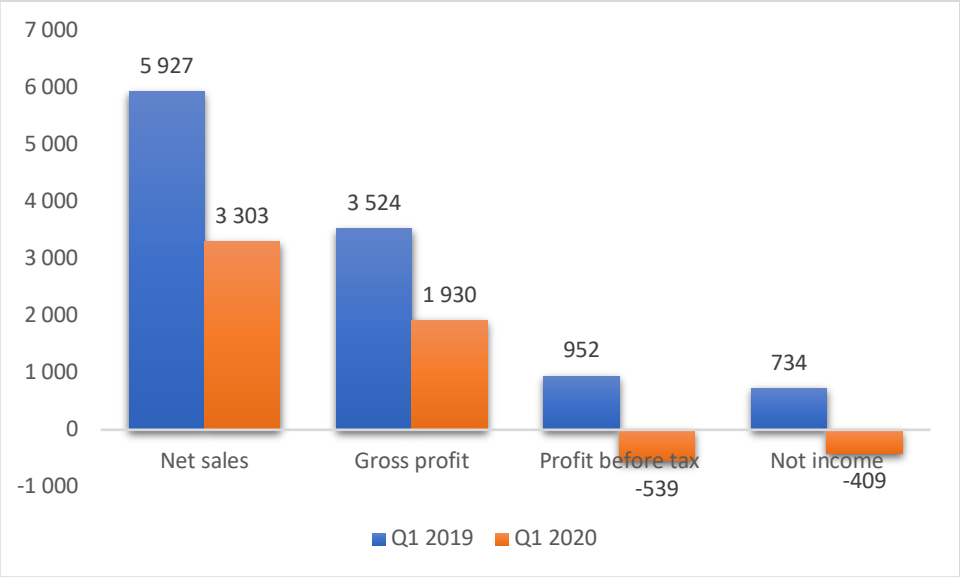

Figure 5. Key financial figures of the Inditex
Source: STATISTA[52]

Table 2. Inditex end-of-year inventory valuation

Descriptions	31/01/2021	31/01/2020
Raw materials and consumables	146	104
Goods in process	34	36
Finished goods for sale	2.142	2.129
Total	**2.321**	**2.269**

Source: STATISTA[52]

28% to €20.4bn. Although the pandemic was a major disruption, and many retailers did not survive, Zara came through with a reduced profit margin. Several factors contributed to this achievement.

(1) Product adaptation. Feedback from the sales outlets (when not in lockdown, and from online) was that consumers wanted clothes to match their "working-from-home" lifestyle. So, Zara's expertise in responding quickly to demand came into operation, and the products presented to consumers were knitwear, body suits and baggy shirts for women, and casual shirts and jeans for men. Also featured were pyjamas and tracksuit bottoms. This is demand-led retailing.

(2) Domestic suppliers. Although the global supply chains were significantly affected, local suppliers were busy, and their number increased. They contributed over €4bn during the year. These suppliers were agile, flexible, and used to working with low inventory levels.[53] Regarding the global supply base, Inditex has fulfilled contractual

obligations, has paid for all orders placed, has not cancelled orders, and has endorsed financial support initiatives.

(3) Online platform. The Company had been developing their online channel since 2012, but the pandemic boosted change. According to STATISTA,[52] "Total integration of Stores and Online" has been achieved. According to REUTERS,[54] "In June 2020, Inditex unveiled a $3 billion investment in tech to make it easier for customers to track the items they want, blurring the lines between online and in-store shopping. This will allow shoppers to browse a specific store's stock to buy items for collection the same day, reserve a changing room, find garments in store via a map and self-check-out using QR codes." The impact has been significant. Online sales increased by 77%, to account for 32.4% of total sales.[53]

(4) Restructuring the retailing channels. The physical store network has been scrutinized and Zara has decided to close stores that are smaller and older.[54] This is to develop their omnichannel strategy – having large central stores alongside the online platform. Inditex has said it is not planning for redundancies, but relocation.

Hennes and Mauritz (H&M) is widely regarded as Zara's main competitor. Using the terminology of Camargo et al.,[49] H&M is a Fast fashion brand, whereas Zara represents Ultra-fast fashion. H&M sub-contracts all its manufacturing needs and sources globally, with an estimated 50% of its products coming from China, with Bangladesh and India in second and third places. Suppliers are expected to offer low prices and to implement technologies that promote flexibility and reductions in batch sizes. Inevitably, the requirement for low prices leads to higher levels of inventory, and H&M have reported problems with inventory management due to unsold stock on several occasions.[55, 56] Before the Pandemic struck, the Company was said to have a $4 billion inventory problem.[57] When the Pandemic hit, the weekly sales figures for H&M reduced drastically. The chart shows weekly year-on-year sales growth reduced to minus 65%.

Lost sales led directly to a financial loss. The net loss for the first six months of 2020 was €195 million, which can be compared with a net income of €1.55 billion for the first half of 2019. The Company honoured the orders already being processed but held back on placing new orders. The situation improved in the third and fourth quarters, although the annual report reveals the year-on-year sales to be €18.7bn – a fall of 20%. Annual profit after tax fell to €118m from the previous years' figure of €1.3bn. In the annual report, this outcome is presented in a positive light. "Despite the COVID-19 situation, through our efforts and attractive customer offering we succeeded in growing our customer base in 2020 and kept inventory well under control. With strong, profitable online growth and good cost control we ended the year in profit and in a strong financial position." The evidence that inventory was kept well under control is not presented, and this reference to "inventory" is the only place it is mentioned in the report. Without taking anything from the fact that the year's trading did return a profit, there are several pointers to alternative evaluations of H&M's performance.

1. Product adaptation. There is very little in the company literature that points to adaptations relevant to consumer lockdowns. There is no communication about providing clothes for people working at home or participating in leisure activities. Failure to respond to demand leads to unwanted inventory and financial losses.
2. Domestic suppliers. Whilst H&M have some local companies in their supply chains, there is no indication that their potential for responding to demand has been a factor during the pandemic year. The company's supply chains are set up to keep costs low, and this constrains the extent to which flexibility and adaptation can be

exploited. It also reduces the options for inventory management by manufacturing to meet demand.

3. Online platform. H&M did see an increase in their online sales, but other online retailers showed even better results. Whereas H&M posted a 40% increase in the second quarter and a 27% rise in the third, Zara averaged a 75% increase over the same periods. JUST-STYLE[51] has opined that H&M is paying the price for being 'a digital laggard' and suggests that the company must 'must rapidly align its online proposition with competitors to avoid a repeat of this next year.'

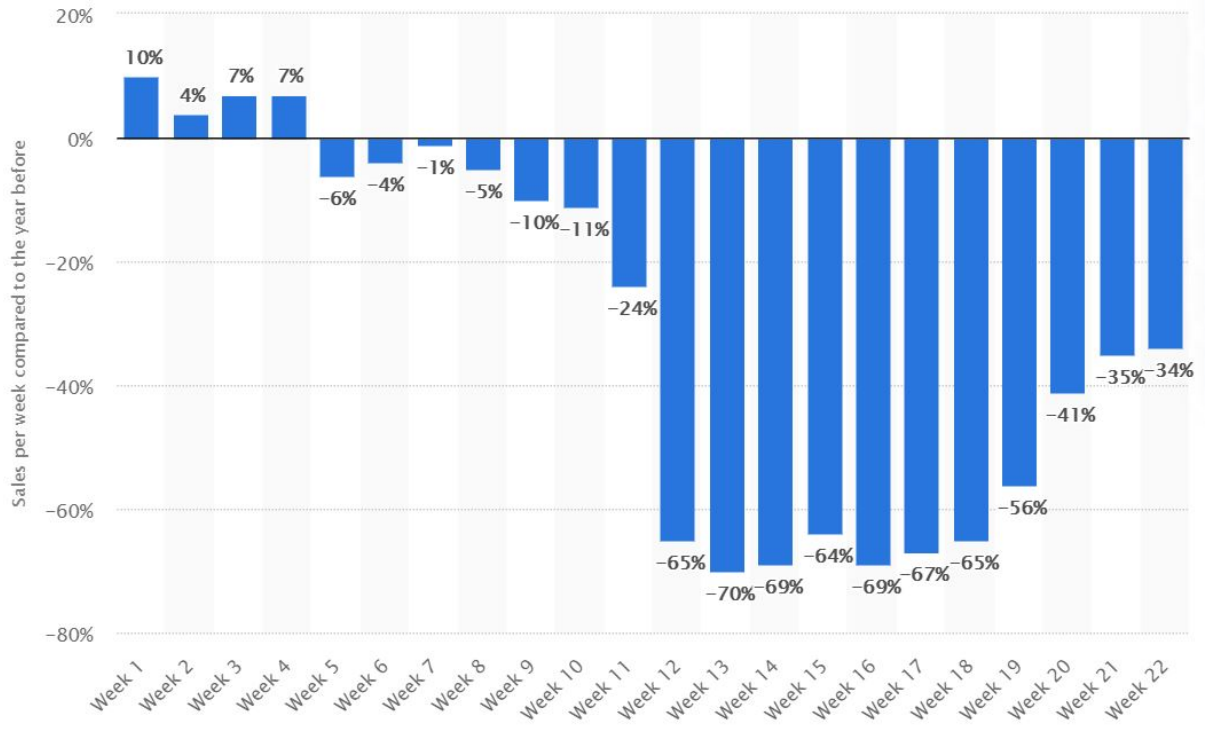

Figure 6. Weekly sales development of H&M Group worldwide 2020
Source: H&M Group[58].

4. Restructuring the retailing channels. H&M has pursued a policy of opening stores with a confidence that this is what consumers want. The pandemic year has shown that there are risks with this strategy, but these risks can be reduced with an omnichannel offering. The company recognises that it needs to contract its estate: 'For 2021 the plan is that 350 stores will close and just over 100 new stores will open'.[59] H&M has a strong sustainability story, and is developing exemplar brands (Arket, Monki, Cos) and outlets for second-hand clothing (Sellpy and Cos Resell), with numerous options for restructuring.[60]

ASOS has pioneered the exclusive online retailing of fashion products. Camargo et al.[49] presented the company as an adopter of the ultra-fast fashion strategy, selling its own brands as well as many other fashion brands. Launched originally as "AsSeenOnScreen", the company focused on celebrity fashion and capturing the latest trends showcased by the media. To achieve this, it needed suppliers that were either onshore or close-to-shore. Its UK suppliers achieve lead times of 2 weeks, and items from Turkey deliver in 4-6 weeks. The company has seen consistent rapid growth, as documented by Carp (2018), with an average growth in sales of 20-25% per annum. The UK is the largest market, closely followed by the EU. Target markets for future growth are the USA and the rest of the world, with extensive

investment in distribution centres, known as fulfilment centres, in the UK, US and Germany. Annual reports for ASOS cover the period 1 September – 31 August, so the 2020 data includes the first lockdown with the closure of many places of work across the globe. Despite these disruptions, ASOS[61] reported that total sales grew by 19% to £3,263.5m (€3,655m) and profit before tax increased to £142.1m (€159m), an increase of £109.0m (€122m) on the previous year. Profits after tax were £103.3m (€130m)

To complete the comparisons with Zara and H&M, the 6-month report commencing 1 September 2020 has provided data for trading during on-going pandemic disruptions. During this period, ASOS acquired a number of Arcadia Group brands and 700,000 new UK customers. First-half sales were up 24% and profits were a record £106m (€122m). Sales growth was healthy for all ASOS markets, and exceptional for the UK (39%). ASOS Design had a year-on-year growth of 24%, attributed to 'our agility and flexibility to shift into casual and active wear categories.' Sales figures reveal the magnitude of this effect: 'Our Face + Body category grew by a record 114%, with active wear growing by 95% and casualwear growing by 69%.'

(1) Product adaptation. The Annual Report refers to the impact of the pandemic on every part of the business – and on their customers. The company recognised the need for great agility, with adaptation to changing operational needs and disruptions throughout its supply chains. They anticipated dramatic and unpredictable shifts in consumer demand. The situation required constant monitoring and management intervention. Consumer interest in special occasion and formal wear was stagnant, as opportunities for social gatherings were restricted and home working was widespread. On the other hand, there was strong demand for casual wear and other lockdown-relevant products – triggering responses for the design and manufacture of products to meet consumer requirements. The ultra-fast fashion capabilities of ASOS design and its close-to-market suppliers were fully utilised.[61]

(2) Domestic suppliers. The ASOS supply chain is global in scope and operates according to the Company's Supplier Ethical Code. There are approximately 896 factories and 173 suppliers in 24 countries. All suppliers assembling and finishing the garments are fully mapped. Information about the location of factories is given as the total per country, together with the number of workers. Data is available on the ASOS[62] plc web site, dated March 2021, and countries with more than 10 factories are listed in Table 3.

Table 3: Analysis of factory size of ASOS suppliers

Country	Factories	Workers	W/F	Average W/F
China	231	23.665	102	145
India	217	40.787	188	
Turkey	130	14.877	114	SL & V: 690
Romania	61	5.048	83	
Bulgaria	39	2.740	70	Europe: 84 Turkey – 114 Rest of Europe - 60
Sri Lanka	30	22.659	755	
United Kingdom	24	1.332	56	
Italy	24	501	21	
Vietnam	22	13.718	624	
Greece	19	463	24	

Source: ASOS[62]

Although China has the most factories, India has the largest number of workers. However, these factories are not large – with an average of 145 workers in each factory. Sri Lanka and Vietnam have larger factories – with an average of 690 workers. Altogether, in the Far East, there are 500 factories and 100,828 workers. European countries have fewer factories (297) and far fewer workers (24,961). Factories in Turkey average 114, and the rest of Europe average 60 workers. This suggests that approximately 20% of ASOS products have a requirement for really short lead times, provided by near-to-shore suppliers. Most of the factories are of medium size – specialising more in smaller batches and providing the service of agility. This strategy feeds into inventory control, so that there are no large accumulations of stock anywhere in the supply chain, including the distribution centres. Only the factories in Sri Lanka and Vietnam are larger and are more likely to be given larger orders in return for more competitive prices. The picture emerging is that ASOS has supply chains that specialise in smaller batch production, with a significant proportion located in Europe to provide very short lead times to capture Fast Fashion trends.

(3) Online platform. ASOS has invested heavily in IT systems and its web site. With 23 million active customers worldwide, the sales platform is not static. A steady stream of innovations is evidence of continuing development. Examples from the past year include development of new brands and the development of the ASOS app to share product boards with friends, track orders and receive order and return updates.

(4) Restructuring the retailing channels. Whilst ASOS does not have physical stores, it is investing regularly in its hubs for distribution: in the UK, Germany and the US. In the past, there have been problems affecting product availability, sales and costs. The strategy has been to invest in automation and in software systems. A second UK hub is planned over a three-year period.

Zara, H&M and ASOS are all regarded as leaders in the fashion world. They are large, have a global reach, and are committed to developing their own sustainability stories. They have all survived the pandemic year in profit, so they are companies the rest of the sector can learn from. Yet there are significant differences: in the way they structure their supply chains, the extent to which they implement demand-led manufacturing, and in their engagement with consumers. Supply chains that are geared to large batches of low-cost products are vulnerable to disruption. This is shown in the H&M case, and it does exacerbate inventory problems for fashion products (where demand cannot be forecast accurately). Inventory is a form of waste, and the pandemic has provided an extreme disruption of fashion supply chains. As most fashion companies have a supply chain strategy like H&M, there is a strong case here for restructuring. Supply chains that are designed to reduce inventories by having smaller batch sizes and practice agile manufacturing have a greater robustness. Where logistics lead times are important, the use of suppliers located near to the intended markets is advantageous. In different ways, both Zara and ASOS show how this can be done. A ‘balanced sourcing’ model for fashion products in which a significant part of the manufacturing is located close to the market helps to reduce risk and waste, reduce inventory costs, enable demand-led supply and increase consumer satisfaction.

4.3. ‘Less is More’ in Fashion Consumption

An increasing shift of consumers to e-commerce is due to the close of brick-and-mortar retail stores that was witnessed in 2020.[63] A movement of first-time fashion e-shoppers saw an increase of 14% in the US and 17% in China,[64] despite that total online sales fell worldwide. In the US, online sales fell by 30-40%, in Europe by 5-

20%, and in China by 15-25%.[27] This trend was witnessed in people's unwillingness to spend on discretionary goods during uncertain times.[65] Also motivated by a pre-pandemic consumerism critique, consumers are increasingly shifting their preferences towards more sustainable fashion methods of production, including more ethical value chains.[65] Whether these concerns are translated into more sustainable purchases is not clear, although industry efforts to reduce, recycle, refurbish, resell, rent, and repair are already in place.[27] H&M's Loop, its in-store clothing recycling system, is an example of such programmes, although scaling circularity still brings challenges to the fashion industry. Figure 7 illustrates the negative consequences of the recycling decline during the COVID-19 pandemic.

4.4. Circularity Challenges

Despite trends embracing more responsible production and consumption approaches, a step forward towards more sustainably-driven business models that are circular in nature, the textile and apparel waste levels remain high, compromising circularity ambitions: (i) only 10-30% of textiles are recycled after being worn, while nearly all are down-cycled into uses of lower value, which makes them difficult to recirculate;

Figure 7. Consequences of decline in textile recycling during the COVID-19

Source: authors, based on information provided by Dowsett and Obuluts[66] and Berg et al,[67]

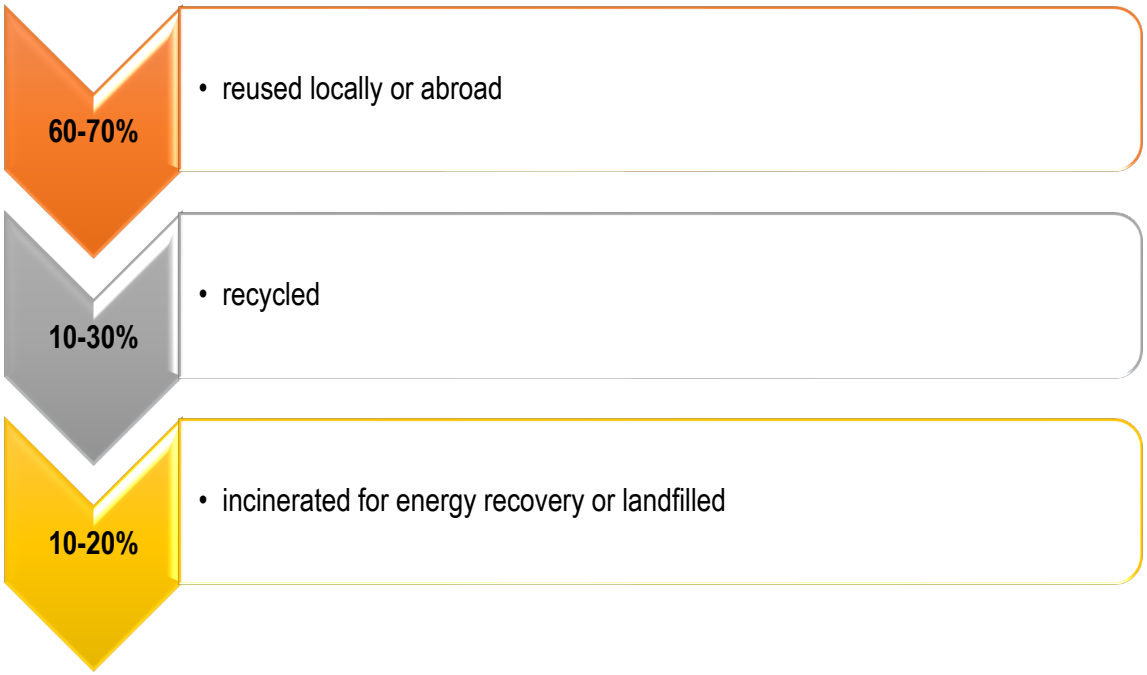

Figure 8. Latest data on textile waste destination

Source: authors, based on information provided by Manshoven et al.[68] and Watson et al.,[69]

(ii) a very small percentage of the resulting products are recycled into new garments, (iii) approximately 12% of fibres are still thrown away on manufacturing plant floors, and (iv) more than USD 500 billion worth of stock was already lost annually pre-pandemic due to lack of garment recycling and under-utilisation.[27, 40] In other words, recycling activities mainly entail lower-value downcycling, thus limiting circularity.

Figure 8 reveals an estimate of the textile waste destination sources, with a large part being exported for reuse or recycling abroad, mostly outside Europe. As mentioned above, recycling activities mainly entail lower-value downcycling into industrial rags, insulation materials and upholstery fillings, thus limiting circularity. With apparel production volumes expected to increase 2.7% annually between 2021 and 2030,[27, 40] scaling circularity is thus of utmost priority.

4.5. Circularity Opportunities

Scaling circularity brings opportunities to both people and the planet. Compared to buying new, a pre-owned garment purchase is estimated to save on average '1 kg of waste, 3040 L of water, and 22 kg of CO_2'.[41]

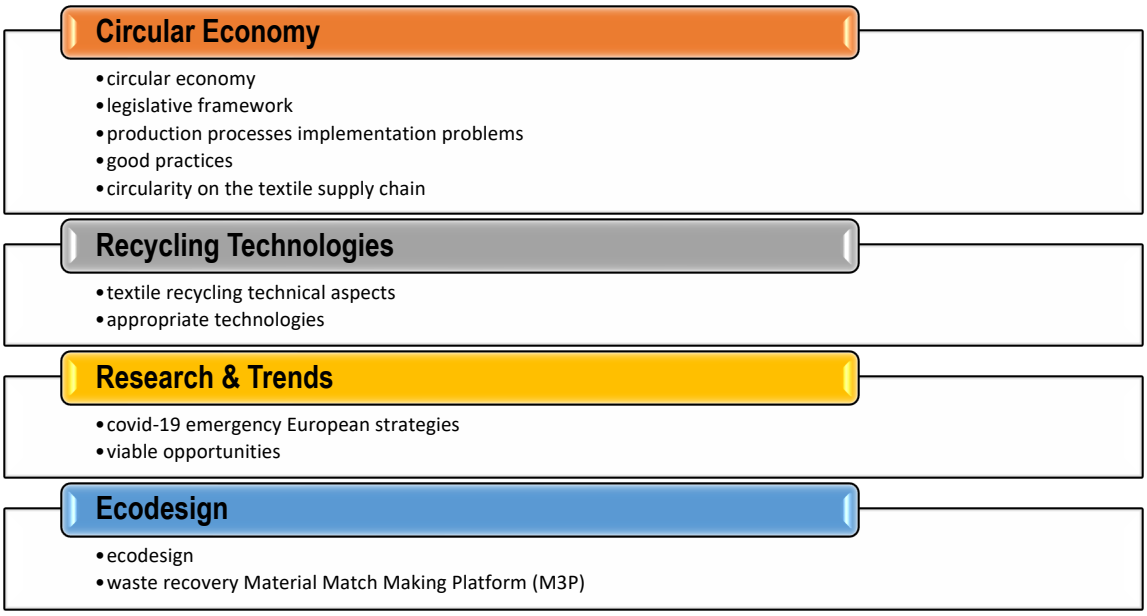

Figure 9. European textile recycling and circular economy approaches

Source: authors, based on information provided by the Expert Network on Textile Recycling (ENTeR)[70]

The EUROSTAT [71] facts and numbers shown in Figure 10 aim to illustrate the devastating consequences that the COVID-19 pandemic had on the textile industry in particular, with dramatic numbers being highlighted in the context of sales decline, when considering the specific time periods involved.

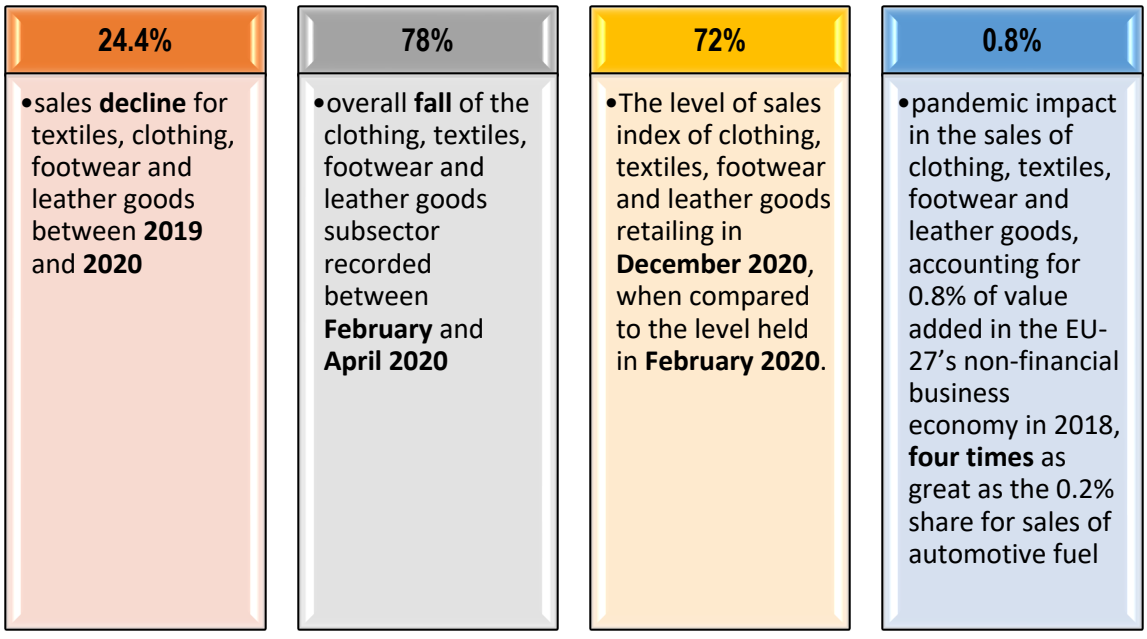

Figure 10. Some of the consequences of the COVID-19 pandemic to the text textiles sector

Source: authors, based on information provided by EUROSTAT[71]

Compared to a linear, own-and-dispose economy, the benefits of circular economy models are clear. In particular, two circular business opportunities emerge,

which may provide advantages to textile and apparel manufacturers and brands: (1) rental and resale; (2) clothing collection, sorting, and recycling. Figure 9 highlights the need to advance in research and design in the textile sector, demonstrating the connection between circular economy, recycling and research.

6. Conclusions

Given the high reliance of the TAF industries on continued production and exporting, it appears clear that the worldwide restrictive measures that were implemented to cope with the COVID-19 pandemic were responsible for significant profit losses, particularly within the apparel, textile and accessories sectors. The decrease in consumption, caused by several geographically wide lockdowns, prompted a subsequent reduction in orders and sales, resulting in a number of open issues and a considerable waste of stocks. The overproduction, and thereby surplus inventory, became even more severe during 2020, with the effect of leaving many suppliers in a risky position and leading to numerous factory closures. As a result, this led to the long-term loss of jobs on one hand and the question of how to dispose of unused materials and clothes on the other. The present paper, therefore, attempts to provide an extensive overview of the TAF status in the aftermath of the COVID-19 crisis, showing that sustainability-driven strategies, which were quite a sensitive topic for the entire industry even prior to the pandemic, are still a main focus for fashion brands and retailers. In fact, around 60% of such companies have stated that customer experience and sustainability actions are, at present, their top strategic priorities for survival and recovery.

This is also due to the need to adapt to the new ‘less is more’ approach adopted by fashion consumers, who were moved by a two-fold behavioural shift: an increase in e-purchasing while consuming more responsibly at the same time, as a result of the pre-pandemic critique in favour of more ethical and sustainable fashion production and chains. With regards to the specific initiatives, TAF actors believe that measuring progress with respect to circular economy thresholds and benchmarking against other key players are necessary for driving change within the whole industry, aiming to making it more resilient.

The implementation of more environmentally friendly processes is deemed to be a secondary concern, including circularity as a competitiveness source for keeping the clothing and textiles sectors in the loop and reducing GHG emissions, along with the assessment of the supply chain. The major issue that was found in the implementation of practical initiatives was the scalability of circularity, due to the manageability of what are still high amounts of waste. Moreover, the recycling approach that is used in almost 70% of the time is one that relies on low-value downcycling, implying the export of huge portions of waste for reuse as insulation material and rags, which restrains the circulating capacity. This, however, should not discourage fashion companies, as various opportunities also stem from the scaling of circularity, such as saving on water and waste costs and decreasing overall CO_2 levels, together with the chance of deploying new business models based on rental-resale and new infrastructures for collecting-sorting-recycling apparel, textiles and fashion accessories.

This study has some limitations, the main one being that it uses secondary sources for the industry status assessment, which constrains the scope in terms of the analysed sub-sectors and research questions that could be discussed. This is partly due to the limited availability of specific scientific studies on the impacts of the COVID-19 pandemic on the TAF sector, which mainly rely on companies’ data sources.

Therefore, it would be interesting for future studies to expand on the above findings to obtain a broader understanding of the connection between sustainability change decisions and the competitive advantages expected or achieved by companies in this context. Additionally, since it was found in this paper that circularity efforts might not be enough to ensure the revival of the TAF industries, a cross-evaluation of the complexity of the decision-making process that fashion brands and retailers go through to safeguard consumer trust and ensure their survival on the market after the pandemic would be useful for industry players in positioning themselves in the current scenario. This will provide a better understanding of what is expected of them and allow for benchmarking against other value chain key players, i.e., competitors, suppliers, distributors, clients, so as to be able to set goals for improving their own performance.

As for the key implications of this paper, the first one is that it shows that the TAF industries urgently need to work towards a greater understanding of the means to mitigate the impacts of the pandemic on its operations and of the issues concerning consumers. The present paper may allow TAF industries to obtain a broader view of the many challenges that resulted from the COVID-19 pandemic and some of the strategies applied by TAF companies to face them, including the importance of maintaining a commitment to sustainability and circularity, considering that consumers are increasingly requiring the industry to be more accountable. Researchers are also able to leverage on the reported insights to prompt further studies that support an increase in awareness of the direction in which the TAF industries are moving. This is particularly relevant and urgent, as it is expected that post-pandemic TAF companies will not be able to rely on the same revenue models anymore. At the same time, TAF companies that have implemented collaborative circular practices more promptly, made their products more durable and engaged their consumers across the whole process will benefit from attracting more clients, final consumers and investors, hence accelerating their recovery, as highlighted by Brown (2020) and Danziger (2020).

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