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Commission



November 2020

# Advanced Technologies for Industry – Sectoral Watch

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*Technological trends in the textiles industry*

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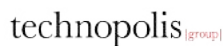
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## Table of contents

<b>Introduction .....</b>	<b>4</b>
<b>Section 1.....</b>	<b>5</b>
<b>1. Setting the scene: industrial context .....</b>	<b>5</b>
1.1 Textile industry value chain: market size and evolution .....	5
1.2 European strengths in technical textiles .....	6
1.3 Environmental challenges.....	7
1.4 Growth prospects in times of Covid .....	7
<b>Section 2.....</b>	<b>8</b>
<b>2. Technological trends.....</b>	<b>8</b>
2.1 Technology shifts and advances – wearable electronics and textile.....	8
2.2 Textile industry firms most active in Advanced Materials, Advanced Manufacturing and Industrial Biotech patent applications.....	9
2.3 Patenting trends in textile innovation.....	9
2.4 Technology adoption by textile companies.....	10
<b>Section 3.....</b>	<b>13</b>
<b>3. Venture capital investment and startup creation .....</b>	<b>13</b>
3.1 Private equity and VC investment in the textile industry .....	13
3.2 Textile industry startups .....	15
<b>Section 4.....</b>	<b>17</b>
<b>4. Skills supply and demand .....</b>	<b>17</b>
4.1 Availability of new technological skills –prominence of Advanced Manufacturing.....	17
4.2 Demand for new skills Big Data and AI .....	20
<b>Section 5.....</b>	<b>22</b>
<b>5. Future outlook: challenges and opportunities.....</b>	<b>22</b>
5.1 Moment of opportunity in reshaping value chains .....	22
5.2 Fight for sustainable and ethical textiles.....	22
5.3 AI-enhanced personalisation and virtual experiences .....	22
5.4 Need for better skills .....	22
<b>Bibliography .....</b>	<b>23</b>
<b>About the 'Advanced Technologies for Industry' project.....</b>	<b>25</b>



## Section

### Introduction

This sectoral report has been prepared in the framework of the 'Advanced Technologies for Industry' (ATI) project, initiated by the European Commission's Directorate General for Internal Market, Industry, Entrepreneurship and SMEs and the Executive Agency for Small and Medium-sized Enterprises.

It analyses trends in the generation and uptake of advanced technologies, related entrepreneurial activities and skills needs in the textiles sector. It interprets data from a list of data sources compiled to monitor advanced technologies and their applications in industry across Europe and key competitor economies.

The starting point of this analysis has been sixteen advanced technologies that are a priority for European industrial policy and that enable process, product and service innovation throughout the economy and hence foster industrial modernisation. Advanced technologies are defined as recent or future technologies that are expected to substantially alter the business and social environment and include Advanced Materials, Advanced Manufacturing, Artificial Intelligence, augmented and virtual reality, Big Data, Blockchain, Cloud technologies, connectivity, Industrial Biotechnology, Internet of Things, micro and nanoelectronics, mobility, Nanotechnology, Photonics, Robotics, security.

The relevance of these specific technologies in the textile industry has been explored through patent analysis and data on private equity investments, skills and technology uptake. The full methodology behind the data calculations is available here: <https://ati.ec.europa.eu>.

This report is structured as the following:

- The first section sets the industrial context.
- The second section analyses technological trends in advanced technologies applied in the textile industry based on patents and text-mining of company websites.
- The third section presents findings about private equity investment and startup/spinoff activity.
- The fourth section explores the supply and demand of skills related to advanced technologies in the textile industry.
- The fifth chapter concludes with a short future outlook.



## Section 1

### 1. Setting the scene: industrial context

#### Key messages

The textile industry is a major contributor to the **European economy**, with a current annual **turnover of €162 bn** (mainly SMEs). The manufacturing of textiles, wearing apparel, leather and man-made fibre employed **1.9 m people** in 221 587 firms in the EU27 in 2018, according to Eurostat figures.

The Covid-19 pandemic has hugely impacted the European textile and apparel industry resulting in supply chain disruptions, drop in demand, liquidity problems and overstocking. Nevertheless, the pandemic is also a window of opportunity to **rationalise European production, revise supply chains and push for more digitalisation and green models**.

The fashion industry has historically relied on exploitative and unsustainable labour and manufacturing practices worldwide, but **advanced technologies offer an opportunity to transform the European textile industry, making it more ethical and environmentally conscious**.

**Sustainability** and **transparency** are thus important priorities, reflecting rising concerns on behalf of consumers and companies about how to alleviate the negative impact of textiles on the environment.

#### 1.1 Textile industry value chain: market size and evolution

The textile industry has been going through an accelerated transformation process thanks to technological advancements, changes in production costs and shifts in global markets.

The bulk of textiles and clothing is manufactured in Asia, particularly China, Bangladesh, India, Cambodia and Vietnam, as well as Turkey. The EU mainly imports finished products from this region. Nevertheless, the EU textile and clothing sector exported €61 bn worth of products in 2019, making the EU the second biggest exporter in the world after China<sup>1</sup>.

European producers are world leaders especially in the area of technical and industrial textiles including non-wovens (industrial filters, hygiene products, products for the automotive and medical sectors), as well as for high-quality garments and interior textiles with a high design content<sup>2</sup>.

The textile sector remains an important part of the European manufacturing industry. The textile services industry is a major contributor to the European economy, with a current annual

turnover of €162 bn<sup>3</sup>. In 2018, there were 221 587 companies active in the textile manufacturing industry (including textiles, wearing apparel, leather and man-made fibre) according to Eurostat, out of which 99% SMEs<sup>4</sup>. The European textile sector represented 2.4% of EU manufacturing employment and 1.4% of EU manufacturing value added.

The largest manufacturers in this industry are Italy, Germany, France, and Spain. The top three, Italy, Germany and France, account for 35%, 14% and 10% the EU turnover respectively<sup>5</sup>. Companies of less than 50 employees account for over 90% of the workforce and produce almost 60% of the value added. However, in terms of foreign trade indicators, about 20% of EU products are exported, despite limited access to many markets outside the EU.

The European textile industry is mainly composed of small and medium-sized enterprises. More than 90% of European textile/clothing companies with less than 50 employees account for over 90% of the workforce and produce almost 60% of the

<sup>1</sup> Facts & Key Figures of the European Textile and Clothing Industry <https://euratex.eu/wp-content/uploads/EURATEX-Facts-Key-Figures-2020-LQ.pdf>

<sup>2</sup> Euratex (2020). The European Textiles and Apparel Industry in the Post Corona Era Proposals for Recovery

<sup>3</sup> Euratex 2018, Eurostat 2017

<sup>4</sup> Eurostat, Annual enterprise statistics for special aggregates of activities (NACE Rev. 2) (sbs\_na\_sca\_r2), extracted in

September 2020 for C13,14,15, 206; according to Euratex key figures "the sector includes ca. 160 000 companies (of which 99.8% are micro and small companies), employing 1.5 million people and generating a turnover of €162 billion."

<sup>5</sup> <https://brussels-express.eu/portuguese-textile-challenging-industry/>



products<sup>6</sup>. In 2017, the EU produced 7.4 kg of textiles per person while consuming nearly 26 kg<sup>7</sup>.

Apparel manufacturing in EU countries is typically made up of medium-priced and high-end luxury products. EU countries such as Italy, France and Germany generally produce high-end luxury apparel. With its cheaper labour force, Poland, Hungary and Romania produce medium-priced products.

In the EU27 countries, labour accounted for 21.3% of the total apparel production cost in 2017, up from 19.6% in 2011<sup>8</sup>. Nevertheless, employment in the textile industry has gradually declined over the 2008-2018 period. In 2011, there were 1 606 720 people employed in the textile and wearing apparel manufacturing industry, with this figure decreasing to 1 451 218 in 2018<sup>9</sup>.

## 1.2 European strengths in technical textiles

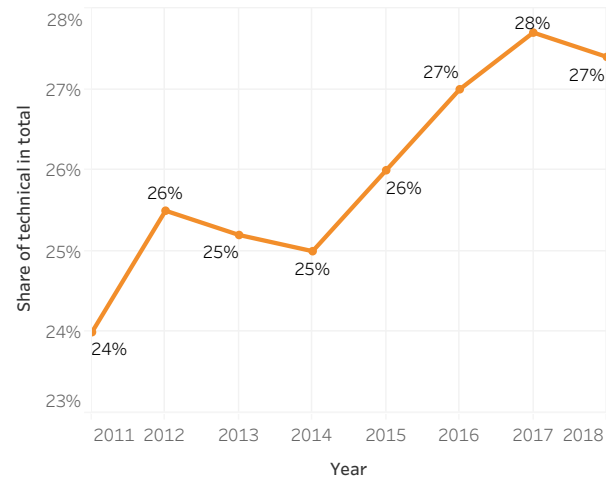
In the EU27 the technical textiles industry represents around 30% of the total turnover in textiles<sup>10</sup> and it accounts for a growing share (27%) of total textile production (see Figure 1). Technical textiles have been defined as “*textiles, fibres, materials and support materials meeting technical rather than aesthetic criteria*”<sup>11</sup>. They are an input to other industries such as the automotive, medical devices and agro-food sectors. The technical textiles industry is commonly regarded as a top value-added growth industry, where Europe has a strong market position and prominent knowhow potential. It is, however, immensely fragmented, comprising a large number of the European SMEs which are specialised in a specific product/market niche (e.g. ballistic protection) or technology (e.g. non-crimp fabric manufacturing)<sup>12</sup>.

The technical textiles industry continues to grow in the EU27, where Germany is the European market leader. In 2018, the European countries with the highest volumes of technical textiles production were Germany (32 000 tonnes), Italy (18 000 tonnes) and the UK (15 000 tonnes), with a total production share of 47%, followed by the Netherlands, Spain, Belgium, France, the Czech Republic, Sweden, Poland, Hungary and Romania, which together accounted for 43%<sup>13</sup>.

On a global level, the US is considered the largest import market for technical textiles with a share of 13.9%, followed by Germany with a share of

7.4%, China with 5% and Japan with 4.5%. China is the biggest exporter of technical textiles with a global share of 25.5%, followed by Germany (8.4%), the US (8%) and Italy (almost 4%)<sup>14</sup>.

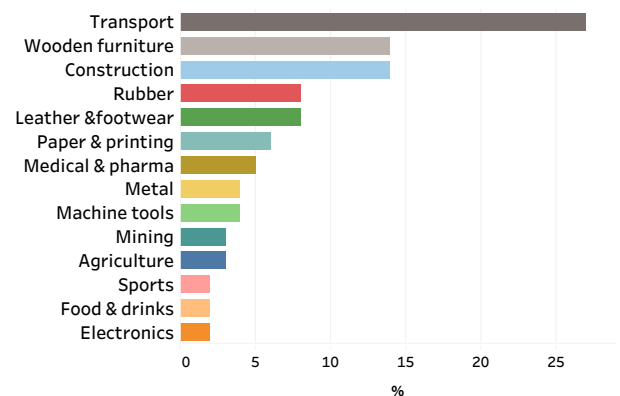
Figure 1: Share of technical textiles in total production



Source: Euratex, 2020

The figure below indicates an approximate breakdown of technical textile usage in different end markets in Europe<sup>15</sup>.

Figure 2: Technical textile usage in different end markets in Europe



Source: Innovative cross-border approaches for Textile and Clothing Cluster co-development in the Mediterranean basin, 2014

The global technical textiles market is predicted to reach €195.9 bn by 2022, an estimated 5.89% growth from 2017<sup>16</sup>.

<sup>6</sup> <https://mordorintelligence.com/industry-reports/europe-textile-industry>

<sup>7</sup> <https://www.eea.europa.eu/themes/waste/resource-efficiency/textiles-in-europe-s-circular-economy>

<sup>8</sup> Eurostat, Annual detailed enterprise statistics for industry, consulted in October 2020

<sup>9</sup> Ibid

<sup>10</sup> Study on Innovation and Technology in the European and Mediterranean Textile and Clothing Industry, 2014

<sup>11</sup> European Economic and Social Committee, CCMI/105 Technical textiles, Brussels, 17 April 2013, Opinion of the European Economic and Social Committee on Growth Driver Technical Textiles

<sup>12</sup> Country Reports on Technical Textiles (TT) in Brazil, Japan, South Korea and USA, 2016: [https://ec.europa.eu/growth/content/country-reports-technical-textiles-brazil-japan-south-korea-and-usa\\_en](https://ec.europa.eu/growth/content/country-reports-technical-textiles-brazil-japan-south-korea-and-usa_en)

<sup>13</sup> <https://www.textiletoday.com.bd/technical-textiles-market-eu/>

<sup>14</sup> <https://www.textilegence.com/en/global-technical-textiles-market-will-grow-exponentially/>

<sup>15</sup> [http://www.enpicbmed.eu/sites/default/files/texmed\\_study\\_innovation\\_and\\_technology.pdf](http://www.enpicbmed.eu/sites/default/files/texmed_study_innovation_and_technology.pdf)

<sup>16</sup> Data Bridge Market Research





Growth of automobile, construction, healthcare, packaging and other sectors provides new opportunities for further development of the technical textiles sector. Technical textiles are used in crop protection, automotive applications, safety components, healthcare, protective clothing, and more (this market is expanding into packaging, sports and protective wear)<sup>17</sup>.

Textiles are widely used in the automotive sector for various applications such as airbags, seat belts, carpets, seat upholstery and tyres. Non-woven textiles are utilised in the indoor lining, floor mats, headliners, belts, etc.<sup>18</sup> Medical textiles are another dynamically expanding field in the technical textile market<sup>19</sup>.

### 1.3 Environmental challenges

An increasingly important priority in the European textile sector is sustainability and transparency, reflecting rising concerns on behalf of consumers and companies about how to alleviate the negative impact on the environment. Customers (both individuals and industrial players) are increasingly demanding more eco-friendly textiles.

In 2015, the global textiles industry was estimated to have consumed 79 bn cubic metres of water, 1.7 m tonnes of CO<sup>2</sup> emissions and 92 m tonnes of waste<sup>20</sup>. According to the United Nations Environment Programme (UNEP), the fashion industry is one of the most polluting, even more than international flights and shipping together. Currently, producers and retailers who are mostly involved in improving the sustainability of textiles, are also working on raising consumer awareness.

There are several crucial factors driving new research and innovation in the textile industry:

- growing demand for sustainable and eco-friendly products/materials/business practices
- resource-efficient processes and less undesired outputs
- investment in new technologies, processes and business practices to be in compliance with stricter environmental legislation
- sustainable image of the company

Take the example of 'vegan clothes', which are becoming increasingly popular. Some brands offer an expansive generalised catalogue of vegan shirts, jackets, accessories and more<sup>21</sup>. Vegan clothes are promoted as being produced from textile, glues and dyes that do not contain any kind of animal-based materials such as leather, suede and wool.

<sup>17</sup> [https://www.trade.gov/sites/default/files/2020-06/Technical%20Textiles%20Resource%20Guide%202020\\_1.pdf](https://www.trade.gov/sites/default/files/2020-06/Technical%20Textiles%20Resource%20Guide%202020_1.pdf)

<sup>18</sup> <https://technicaltextile.net/articles/luscious-market-for-automotive-textiles-3234#>

<sup>19</sup> Yimin Qin, 2016

<sup>20</sup> Pulse of the Fashion Industry report, 2017

<sup>21</sup> <https://techcrunch.com/>

### 1.4 Growth prospects in times of Covid

Covid-19 and the lockdown measures have disrupted the European textile and apparel industry as they broke up supply chains especially from China and profoundly changed consumer behaviour.

In Europe, production fell by 16.8% in the period between January-April 2020 in comparison with 2019. Retail sales of textile products dropped down to 31%<sup>22</sup>. Additionally, employment in the textile sector fell by over 2%<sup>23</sup>.

The whole industry has been hit hard by the Covid crisis. During the second quarter of 2020 sales of woven fabrics decreased by 35%, knitted fabrics by 44%, and the decline in the clothing industry was twice as bad compared to the worst quarter of the economic and financial crisis in 2009 (-37%).<sup>24</sup> Nevertheless, the pandemic also created an urgent new demand for technical textiles in the field of personal protective equipment (PPE).

Producers in China and Italy were particularly affected by the virus, causing significant disruption on the supply side<sup>25</sup>. McKinsey estimated that revenues for the global textile industry (apparel and footwear sectors) will contract by 27-30% in 2020, year-on-year, although it is predicted that the industry might recover up to 4% in 2021<sup>26</sup>.

The issue is especially serious as the sector is composed mainly of firms with less than 10 people in the EU who have little room for manoeuvre. Cashflow and liquidity problems have become apparent as the lockdown kept people away from shops.

Fiscal stimulus and solvency measures by European and national authorities will help save jobs and enable further investment along the supply chain. As part of the Next Generation EU recovery plan and European Green Deal, the Just Transition Mechanism will provide €150 bn to "incentivise European industrial leadership in strategic sectors and key value chains, including those crucial to the twin green and digital transitions".

Nevertheless, the pandemic has also opened a window of opportunity for the sector to rationalise European production, revise supply chains and push for more digitalisation and green models, as presented in the subsequent sections of the report.

<sup>22</sup> <https://www.statista.com/statistics/1131136/coronavirus-impact-on-textile-industry-europe/>

<sup>23</sup> Euratex, 2019

<sup>24</sup> Euratex economic update, second quarter 2020

<sup>25</sup> <https://fairtrade-advocacy.org/wp-content/uploads/2020/04/Coronavirus-communication.pdf>

<sup>26</sup> McKinsey Global Fashion Index estimate, 2019



## Section 2

### 2. Technological trends

#### Key messages

Automated and connected smart textile factories, new manufacturing processes and the use of Advanced Materials are just some highlights of the technological transformation that is reshaping the textile industry. Today, **advanced technologies are also critical in addressing the challenges of the Covid** pandemic era.

Before Covid times, **Advanced Materials** have represented a technological field where European textile firms patented the most. Further relevant technology fields include **Advanced Manufacturing Technology** and to a lesser extent **Industrial Biotechnology** suggesting the importance of eco-innovation in the European textile industry.

In the post-Covid era, the uptake of **digital, environmental and recycling technologies** will become critical for the survival and renewal of the industry. In particular, the use of **AI technologies** offers a potential to revolutionise inventory analytics and to better organise the supply chain. **3D design** collaboration and **Augmented Reality/Virtual Reality** applications will provide a new avenue for companies to facilitate their operation and to engage with customers in a world of restricted free movement.

Smart textiles based on the advancements in material research, electronics and biotechnology will play a vital role in Covid times, a segment where the EU has been showing strengths. **Functional textiles** enhanced by the **Internet of Things** are a dynamic field opening up new possibilities for sensing and monitoring body functions, enabling communication and data transfer between the body and machine and many other innovations.

#### 2.1 Technology shifts and advances – wearable electronics and textile

For several years, the textile industry has been going through an intensive digital transformation process driven by increased consumer demand for personalised products, the connection of textile manufacturing devices based on IoT applications and more automation of production and logistics processes.

Technological innovations created new business models and opportunities for textile companies. For instance, digital textile printing has given companies and consumers the ability to customise and produce consumers' own designs and ideas quickly and relatively cheaply. Innovation in material use has resulted in interesting new solutions, such as waste from citrus peels, milk, pineapples and coffee grounds being used to produce new materials for apparels.

The European textiles industry is under a lot of pressure to be innovative. Many textile companies outsource R&D, making the innovation process fragmented (ad-hoc rather than continuous initiatives).

#### The Covid pandemic accelerated the ongoing digitalisation trends in the textile industry.

As a consequence of social distancing, communication within and between firms in the textile supply chain happens through digital means (i.e. presenting samples and innovations digitally). Covid prompted urgent changes in communication, leading to more digital exchanges and use of visualisation techniques.

Moreover, as it has been highlighted during a recent international conference: *"The textile industry plays a pivotal role in the times of Covid in providing personal protective equipment with functional textile materials and devices, including remote diagnosis and contact tracing or **smart e-textile wearables for combatting coronavirus infections**<sup>27</sup>."* The related technological innovations will play an important part in solving the current crisis.

In particular, the field of wearable electronics covers many aspects of cutting-edge R&D and provides an opportunity for textile manufacturers and fashion designers to innovate with a range of advanced technologies including Advanced Materials, Photonics and Nanotechnology.

<sup>27</sup> <https://www.manchester.ac.uk/discover/news/high-tech-ppe-and-smart-textiles-will-help-fight-covid-19-and-future-pandemics/>





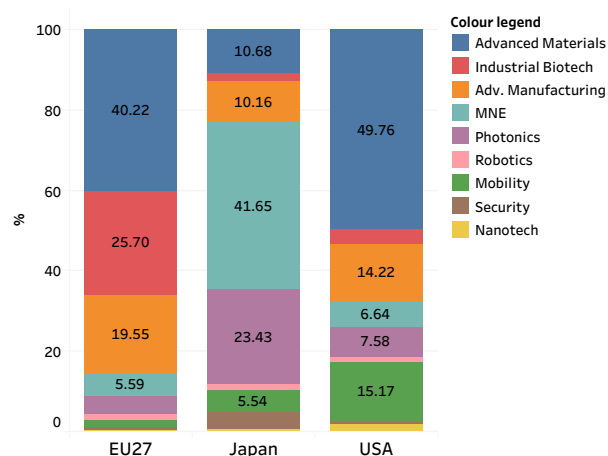
## 2.2 Textile industry firms most active in Advanced Materials, Advanced Manufacturing and Industrial Biotech patent applications

Technology developments can be tracked by patenting activities related to the specific sectoral activities based on patent-based classifications. It has to be noted, however, that innovative ideas in the textile sector are not always patented due to the costly process itself (hence patents tell only part of the reality). The preferred way to protect is through the speed and quality of delivery and the establishment of systems and reputations in their own niches<sup>28</sup>.

In order to understand the specific patenting activities, the analysis of textile patent applications was based on the international patent classification, provided by the World Intellectual Property Organisation<sup>29</sup>. This classification includes a comprehensive schematic for the classification of patents in the area of textile that allows to identify the patent areas in the International Patent Codes (IPC codes) that are specific to the sector. By using this approach, we can representatively capture the patenting activity at EU and global level in the textile sector and observe trends in distribution and development as indicated in this section.

With regard to new technology development, **Advanced Materials** represent the area where European textile firms tend to patent the most (Figure 3). Further relevant technology fields include **Advanced Manufacturing Technology** and to a lesser extent **Industrial Biotechnology**.

Figure 3: International comparison of technology patents by textile firms in 2010-2017



Source: ATI, 2019 Fraunhofer ISI calculations

Patent applications in Advanced Materials represent just over 40% of all advanced technology patents filed by textile companies in the EU27 (Figure 3). Overall, the highest share of patents in Advanced Materials is filed by the US, followed by EU27 which is about **5 times higher than that of Japanese** textile companies.

Nearly 26% and 20% of all patents filed by European textile companies are attributable to **Industrial Biotechnology** and **Advanced Manufacturing Technologies** respectively (Figure 3). The former is also linked to innovation in sustainable and ecological textiles.

The total amount of patents related to Advanced Manufacturing Technologies filed by US and Japanese textile companies during the period 2010-2017 were slightly higher (Figure 3). The **EU27 textile industry has, however, a comparative advantage in Industrial Biotechnology**.

**European textile companies are not well positioned in Micro- and nanoelectronics (MNE) technology** when compared with Japan. Nearly 42% of all advanced technology patent applications filed by textile companies in Japan are related to this field, followed by the US (7%) and the EU27 (6%).

**Photonics** technology is essential in order to allow the integration of novel photonic materials into textiles that enable new design and improved products in the textile industry. Currently, 4.5% of all advanced technology patents filed by textile companies in the EU27 between 2010 and 2017 can be attributed to the field of Photonics. The greatest share of Photonics patent applications have been filed in Japan (23%), followed by the US (8%).

**Artificial Intelligence, Big Data or Internet of Things** patent applications have not been filed by textile industry firms directly. This result might be also a consequence of textile firms not being active in these technological areas themselves but rather being simple users as it will be presented in the next sections.

## 2.3 Patenting trends in textile innovation

When looking at patenting trends in the field of textiles overall, China is a global leader followed by Japan, which is significantly less active in textile patenting, the US and the EU27 in fifth place.

Looking at the EU, the greatest share of textile patent applications in all global patent applications have been filed by German entities (Germany is

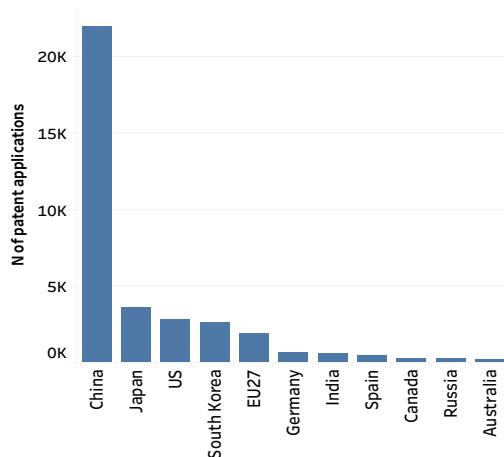
<sup>28</sup><https://publications.jrc.ec.europa.eu/repository/bitstream/JRC106917/kjna28634enn.pdf>

<sup>29</sup>[https://www.wipo.int/ipc/itos4ipc/ITSupport\\_and\\_download\\_area/20100101/pdf/scheme/core/en/ipcr\\_en\\_d\\_core\\_2010.pdf](https://www.wipo.int/ipc/itos4ipc/ITSupport_and_download_area/20100101/pdf/scheme/core/en/ipcr_en_d_core_2010.pdf)



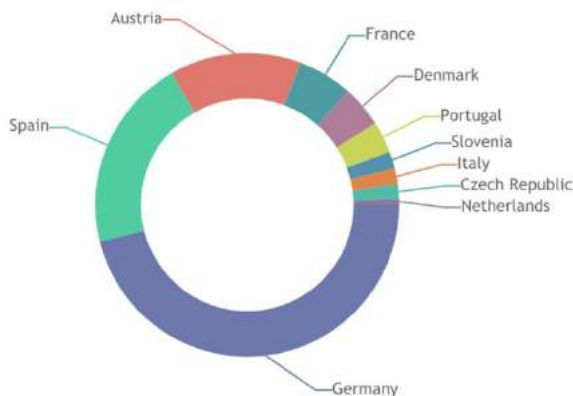
top-five globally), followed by Spain, Austria and France as depicted in Figure 4.

Figure 4: International comparison of total patent applications of textile firms in 2017



Source: Technopolis Group based on IPGRAM calculations<sup>30</sup>

Figure 5: Total number of textile patents among European countries, top 10 in 2010-2017



Source: Technopolis Group based on IPGRAM calculations

The graph clearly shows that **Germany plays a key role in the EU27 position by contributing to roughly 45% of the EU27 textile patents. Spain, Austria, France, Denmark and Portugal follow** with a lower share.

<sup>30</sup> IPGRAM is a fast patent analytics platform for building technology landscapes and benchmarking patent portfolios. It is built around EPO Worldwide Patent Data Collection of 100+ million documents. The projects where this tool has been used: ComEHEC Project by Business Finland; Finnish Forest Industries Association.

<sup>31</sup> Based on a search algorithm, company websites were analysed for links to each specific technology in September-

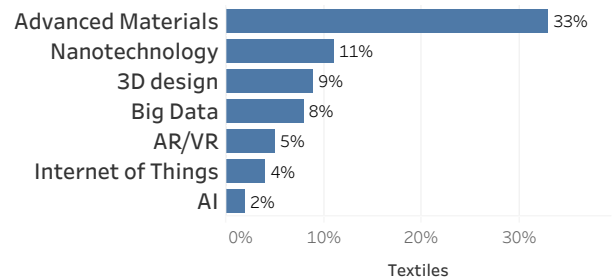
## 2.4 Technology adoption by textile companies

Through a large-scale text-mining<sup>31</sup> of company websites belonging to the textile industry, insights could be obtained on current developments related to advanced technologies in this sector. This analysis provides information on the use of technologies that companies communicate about through the web. This analysis, however, cannot draw conclusions about the adoption of the technologies that are not mentioned, e.g. behind the scenes processes, or to capture the technology adoption by stakeholders that are not present in online content, such as the uptake of technologies by the textile sector.

Figure 6 presents the share of textile company websites that reference specific terms associated with advanced technologies.

The results indicate that **Advanced Materials** is the term most associated with the textile sector company websites, followed by **Nanotechnology and 3D design/printing**.

Figure 6: Share of textile company websites referencing advanced technologies



Source: Technopolis Group based on text-mining company websites

The use of **Advanced Materials** in textile has been steadily growing. **New materials with an anti-bacterial and antiviral function** are expected to be in higher demand as a result of the Covid-19 pandemic. Advanced Materials innovation in the textile industry is mostly led by multinational companies in countries such as Denmark, Germany, the Republic of Korea, Taiwan and the United States<sup>32</sup>.

In particular, the medical textile market is waiting for new innovative applications in the area of Advanced Materials. Recent drastic developments in the field of surgical implants, extracorporeal

November 2019. The analysis of 3 162 websites of textile companies across seven European countries, including Denmark, France, Germany, Italy, the Netherlands, Poland and Spain.

<sup>32</sup> [https://www.ilo.org/wcmsp5/groups/public/---ed\\_dialogue/---sector/documents/publication/wcms\\_669355.pdf](https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---sector/documents/publication/wcms_669355.pdf)



devices, tissue engineering, antimicrobial barrier fabrics, cardiovascular devices, and endovascular treatments have resulted in increased demand for material innovation, in particular in the medical textile industry<sup>33</sup>. Revenues in the global smart fabrics and textile market grew from €600 m in 2012 to 1.5 bn in 2017<sup>34</sup>.

**Nanotechnology** is widely used in the textile industry in order to enhance textile attributes, such as fabric softness, durability and breathability, water repellence, fire retardancy, antimicrobial properties, etc. in fibres, yarns and fabrics.

Nanoengineered textiles are enabling the industry to give new functions to textiles and clothes. Existing functionality can be improved using Nanotechnology and it can provide entirely new properties or the combination of different functions in one textile material. Applying nanoparticle coatings to textiles and clothes can generate antimicrobial, UV-blocking, antistatic, flame retardant, water and oil repellent, wrinkle-resistant and self-cleaning properties<sup>35</sup>.

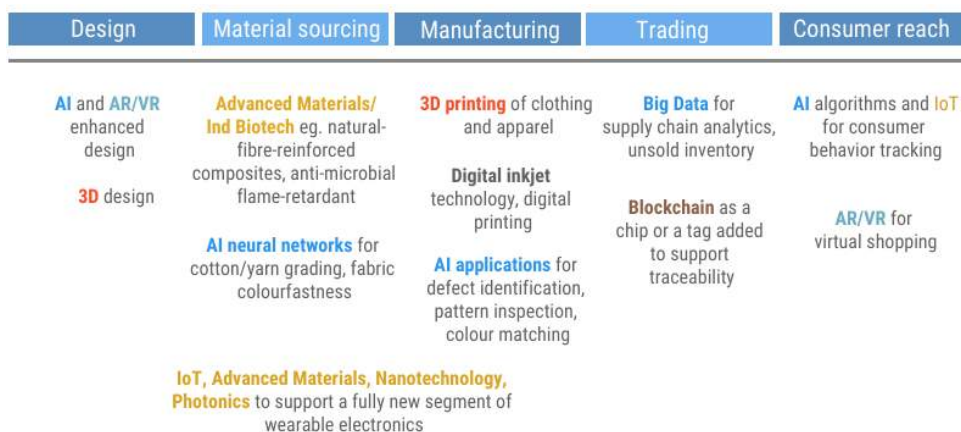
Photonic technologies, materials and devices including films, nano-additives and optical fibres for textiles, have already been adopted by the textile industry. Optical fibres and LEDs are well established in the fields of optoelectronics and telecommunications, but the technology is now being applied in the textile industry. Scientists have learned how to 'knit' optical fibres and combine them with textiles as well as manufacture flexible LED arrays and light-emitting fabrics.

**Integrating the Internet of Things and electronics into clothing** is a dynamically developing concept, which opens up a whole array of multi-functional, wearable electro-textiles for sensing/monitoring body functions, delivering communication facilities, data transfer, individual environment control and many other applications. IoT in textile promises further potential positives with automated processes, higher output, predictability in production and maintenance, as well as new business models.

Nowadays, wearable e-textile technologies are facing exponential growth. E-textile is a multidisciplinary research field, including several fields, such as textile, materials, electronics, mechanics and computer engineering. The wearable e-textiles can be made with several materials using different fabrication methods.

**3D printing** has changed and impacted engineering, manufacturing and the use of materials due to its ability to produce objects from a variety of materials, ranging from soft polymers to rigid ceramics. 3D printing technology provides the textile industry an opportunity to experiment with innovative materials and structures that could not be done before. This technology can also become a critical factor in the sustainable development of textile manufacturing. 3D printers can use recyclable materials more effectively in the production stage, helping to achieve zero-waste goals. However, research in the 3D printing of textiles has lagged behind other areas, such as material innovation, due to several obstacles including the characteristics and flexibility of textiles.

Figure 7: Use of advanced technologies throughout the textile industry value chain



Source: Technopolis Group, 2020, based on the review of use cases in the sample

<sup>33</sup> Anandjiwala, Rajesh D. Role of advanced textile materials in healthcare. N.p., 2006. Web.

<sup>34</sup> Hexa Report: Global Smart Fabrics and Textiles Industry 2017 Market Research Report (QYResearch, 2017).

<sup>35</sup> <https://www.nanowerk.com/spotlight/spotid=42713.php#:~:text=The%20potential%20of%20Nanotechnology%20in,the%20textile%20industry%20is%20considerable.&text=While%20antimicrobial%20properties%20are%20exerted,by%20nano%2Dmetal%20oxide%20coatings.>



Textile production has also been transformed in the last decade by the introduction of industrial digital printing based on inkjet technology. The market for digital textile printing is characterised as a fast-growing market due to several reasons such as trends in customisation, smaller production batch sizes, product availability and ecological requirements. Two of the fastest-growing applications in digital textile printing are dye sublimation printing and pigment printing<sup>36</sup>.

**The contribution of Artificial Intelligence to the field of the textile industry** is relatively new, but increasingly relevant. The use of AI in textile processing is limited to only a few applications, notably machine vision to detect errors and anomalies. For instance, textile companies are applying computer vision technology to fabric pattern recognition and fabric colour matching. This technology cuts the time taken to inspect the quality of the fabric and saves on costs. It enables firms to easily match original design colours with the those in a finished textile product and assign a “colour tolerance”. Examples of further commercial uses of AI technologies in the textiles industry include:

- AI application to detect visual defects and measure wrinkles in the fabric
- machine learning to identify previously hidden patterns from raw data to help businesses improve efficiency and maintenance
- machine learning to optimise inventory and supply chain management
- AI-based yarn fibres for new designs prototypes and materials
- AI algorithms to track consumer behaviour

AI applications in the textile sector remain a challenge due to a lack of system integrators and consultants/specialists focused on the textile industry<sup>37</sup>.

**The use of augmented reality and virtual reality** is still limited to some large companies and larger initiatives, but it will become more important in the future especially in retail and customer engagement as the last segment of the industry value chain. AR/VR can be used in the textile production and machine maintenance (inspecting them without disassembling can quickly identify a problem and prevent downtime).

Focusing on the customer experience and brand enhancement, digital sampling and virtual showrooms enhanced by AR/VR can significantly improve cost-efficiency and marketing efforts. The

promise of AR/VR can also play a role in reducing waste by using digital instead of physical samples.

With virtual reality customers can also become part of design and collection shows remotely and review products even with restricted travelling. Textile firms experiment for instance with using online games to introduce consumers and introduce their latest products. Video games can plunge users into a virtual reality experience designed to highlight the new features of the collection but also collect valuable user data.

For instance, Adidas, the second-largest sportswear company after Nike, has been testing the possibility to design a sweater, with a body scan. This scan has the objective to determine if the sweater has the right fit and makes a faster knitting possible by a state-of-the-art machine within four hours. This new practice allows rationalisation of resources, customisation and proximity to consumers<sup>38</sup>.

<sup>36</sup><https://imieurope.com/inkjet-blog/2018/4/16/the-digital-revolution-in-textile-printing-requirements-and-trends-for-inkjet-inks-and-textile-chemistry>

<sup>37</sup><https://emerj.com/ai-sector-overviews/artificial-intelligence-in-the-textile-industry-current-and-future-applications/>

<sup>38</sup><https://www.reuters.com/article/us-adidas-manufacturing-idUSKBN16R1TO>



## Section 3

### 3. Venture capital investment and startup creation

#### Key messages

Europe's textile industry has been witnessing an increasing VC investment since 2010, nevertheless VC funds invested more in the US and China. On the other hand, the highest number of funding rounds have been concluded in the EU27 followed by the US that also indicates a strong startup activity in Europe.

Hotspots of textile VC investment in advanced technologies are concentrated in **Italy, Spain, France, Germany and Sweden**. Nevertheless, France and Germany had the highest number of funding rounds in the EU27. The EU27's textile sector is an increasingly attractive 'destination' for foreign investment, growing significantly since 2013 in the majority of European countries.

Some 21% of the investment-backed startups **innovate in the area of materials**, such as using new fibres, composite materials, eco-friendly chemicals and bio-based materials. Sustainability has been an important topic and **14% of startups have their activity focused on 'greening the textile industry'**. Using web-solutions or moving activities online have also featured in Europe's textile scene in recent years. A **fifth of startups are digital**. They develop for instance innovative web solutions to promote digital weaving and dyeing, offer digital dressing that allows customers to try on clothes in online stores or simply create online platforms.

#### 3.1 Private equity and VC investment in the textile industry

The scale of venture capital and private equity investment was tracked using a combined set of Crunchbase and Dealroom data. From the joint database, companies were selected by filtering for the 'textiles' category<sup>39</sup> and also searching in the business descriptions of companies.

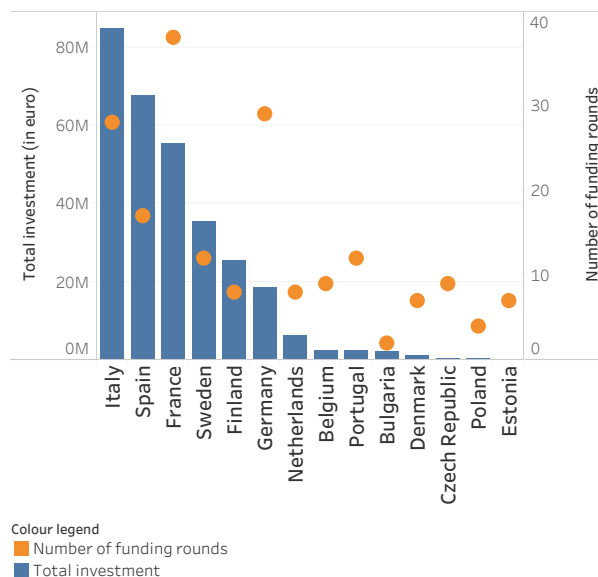
Crunchbase provides information on venture capital-backed innovative companies. Dealroom contains the same type of information but with a better coverage for Europe. The investment figures presented in this section refer only to the funding rounds where a value has been disclosed.

The analysis reveals that there are certain hotspots of VC activity in the area of textile innovation in Europe, such as **Italy, Spain, France and Sweden**, as depicted in Figure 8 in terms of the total amount of investment. Although Germany only managed sixth position regarding total investment, it ranks first in terms of the number of companies that are obtaining venture capital.

Indeed, the number of VC-backed firms in the textile field in the EU27 has been the highest in Germany, France and Italy, followed by Spain and the Netherlands. The share of VC-backed firms has

been also compared to the total number of textile firms active, as captured by the Eurostat Structural Business Statistics (see Figure 9).

Figure 8: VC investment in textiles, 2000-2019



Source: Technopolis Group based on Crunchbase and Dealroom data

Italy is well known at the European and global level, and offers many investment opportunities to

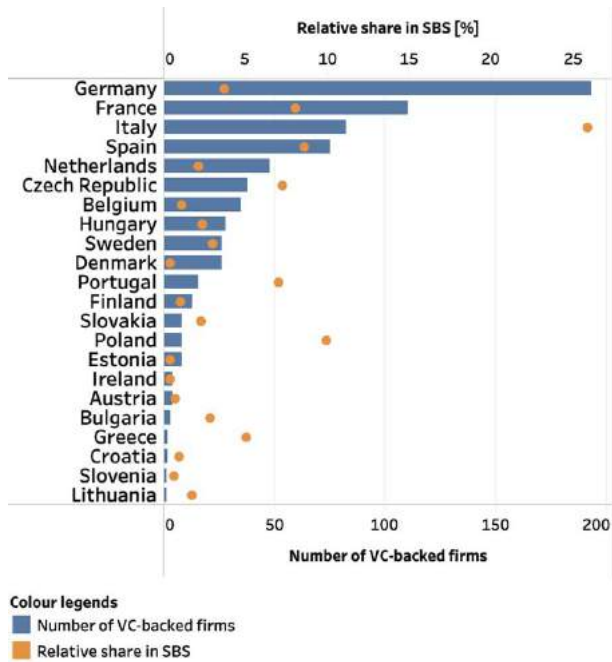
<sup>39</sup> The selection resulted in a list of investment-backed firms that in some cases go beyond the strict definition of textile manufacturing and include also startups developing e-commerce solutions.





foreign investors<sup>40</sup>. High growth in Spain is thanks to its footwear, leather, clothing and fur industries<sup>41</sup>. Sweden is home to several leading fashion brands. Investments in the Swedish FashionTech startups grew from €42 m to €2.4 bn in just five years.<sup>42</sup>

Figure 9: Number of VC-backed firms in the field of textile and share relative to the share of textile companies in total number of firms in Structural Business Statistics, 2010-2019

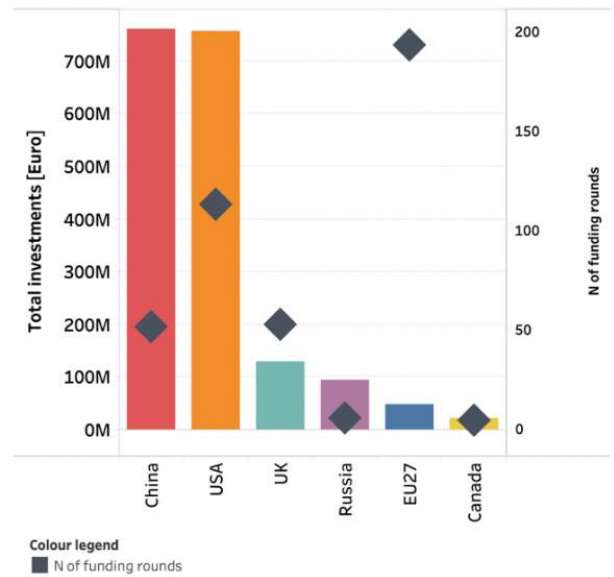


Source: Technopolis Group based on Crunchbase and Dealroom data

Note: Share is calculated to the total firms in C13 and C14 in Structural Business Statistics (SBS)

Europe’s textile industry has seen an increasing share of VC investment since 2010, but the US and China still take the lion’s share of investment, as shown in Figure 11.<sup>43</sup> More impressive perhaps is the strong growth in funding rounds concluded in the EU27, leading the US by some margin, which shows strong startup activity in Europe. VC investment in textiles and fashion is, however, far way lower than in other manufacturing sectors.

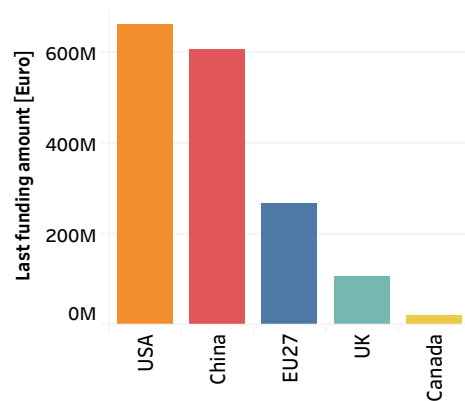
Figure 10: Venture capital investment in textiles (2000-2019), an international comparison



Source: Technopolis Group based on Crunchbase and Dealroom data

The EU27 took overall third position, and even scored the highest last funding round (around €300 m), as shown in Figure 11. In this international comparison, using the last funding amount as a metric, differences between the EU27 and key players such as the US and China are evident. The UK and Canada are also important players.

Figure 11: Last funding amount (2000-2019) in international comparison



Source: Technopolis Group based on Crunchbase and Dealroom data

<sup>40</sup> <https://www.lawyersitaly.eu/manufacture-and-sell-textile-products-in-italy>

<sup>41</sup> <https://www.fibre2fashion.com/industry-article/2491/spanish-textile-machinery-industry>

<sup>42</sup> <https://medium.com/@josephstockholm/fashiontech-startups-in-sweden-1885464a823a>

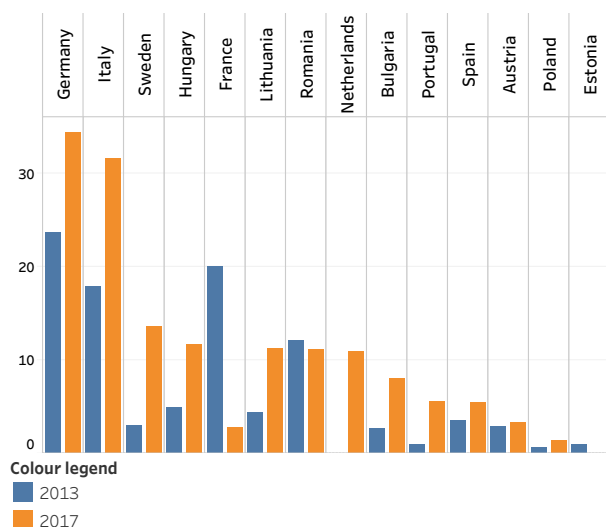
<sup>43</sup> Due to restrictions in the available dataset, Japan and South Korea are not presented.





Europe’s textile sector is a clear ‘destination’ for foreign investors outside the EU27<sup>44</sup>, showing significant growth in the majority of countries since 2013, the year when statistical data was first provided (see Figure 12). Portugal, Sweden and Bulgaria experienced the largest increases. The highest extra-EU28 investment per person employed were recorded in Germany, Italy, Sweden and Hungary.

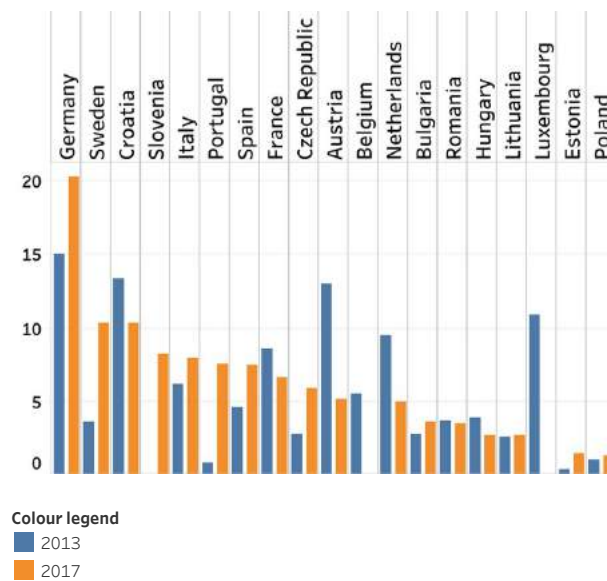
Figure 12: Investments per person employed in the textile industry by foreign (extra-EU28) companies in thous. € per person employed



Source: Eurostat, SBS  
Note: Data refers to investments made by parent companies resident outside the EU28

In some cases, the investments of EU27 companies in the neighbouring European countries is comparably high, which means that companies actively invest in the textile industry of other countries within the EU (Figure 13). Germany and Sweden attracted the highest investments in textile companies. Further countries reporting high investments from other European countries are Croatia, Slovenia and Italy. Portugal, Estonia and Sweden recorded the largest intra-EU28 investment rise between 2013 and 2017.

Figure 13: Investments per person employed in textile industry by foreign (intra-EU28) companies, in thous. € per person employed



Source: Eurostat, SBS  
Note: Data refers to investments made by parent companies resident inside the EU28, in the case of Slovenia and Luxembourg there are no data available for 2013/2017

### 3.2 Textile industry startups

With the aim of exploring entrepreneurship trends in the European textile industry, the number of startups from 2009 until 2019 was analysed based on Crunchbase and Dealroom data. Startups<sup>45</sup> represent the most recent trends of technology development in the industry and typically respond rapidly to industry needs.

The country distribution of startups is visualised in Figure 14. Most startups reflected in the dataset are located in **Germany** (22%), **Spain** (18%) and **France** (14%), together making up more than **50% of the start-up creation** in textile industry in the EU27. Other important players are the Netherlands, Italy and Portugal. However, it is the textile industry in Finland, France, Sweden and Germany that witnessed the highest VC investment amount followed by Portugal and Spain. In Finland, the list is led by Spinnova<sup>46</sup>, a company established in 2014. Spinnova develops a disruptive, ecological innovation that turns cellulose into textile fibre without harmful chemicals.

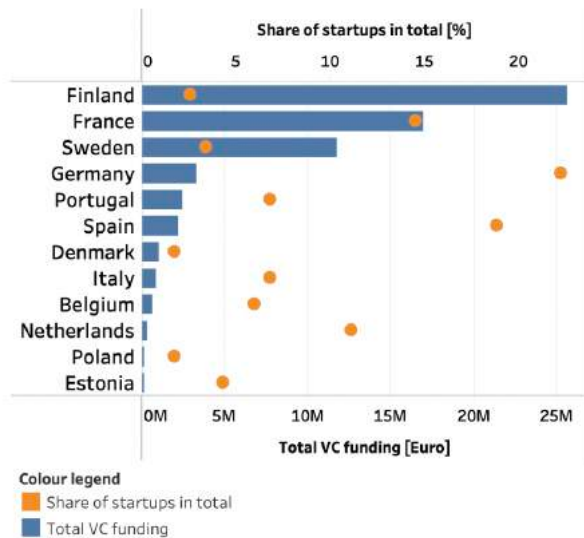
<sup>44</sup> Investment of foreign companies in affiliates located in European countries over which foreign companies have control.

<sup>45</sup> In this report startups are defined as companies that have been created between 2009 and 2019

<sup>46</sup> <https://spinnova.com/>



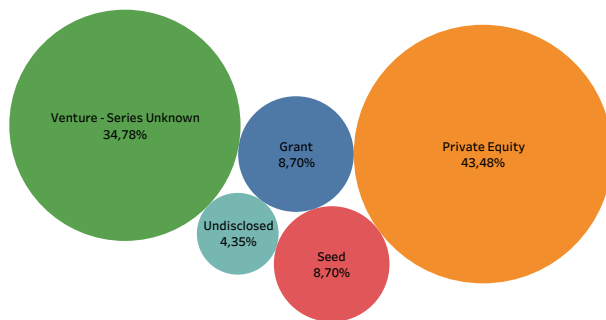
Figure 14: Startup creation and VC investment in startups in the textile industry in the EU27 (2009-2019)



Source: Technopolis analysis based on Crunchbase and Dealroom data

Figure 15 shows the prominence of different funding types in the textile industry among startups in the EU27 countries from 2009 until 2019. The largest source of funding has come from private equity (43%) followed by venture unknown series (35%), then grant and seed funding types.

Figure 15: Type of funding in the textile industry in the EU27 (2009-2019)



Source: Technopolis analysis based on Crunchbase and Dealroom data

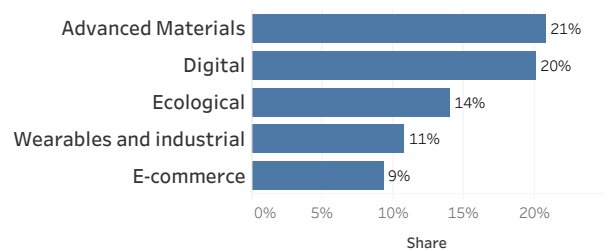
Most of the startups (21% of the total sample) innovate in the area of materials such as using new fibres, composite materials, eco-friendly chemicals and bio-based materials.

Sustainability has also been an important topic, and 14% of startups have their activity focused on greening the textile industry and offer more

sustainable textile manufacturing processes. For instance, some of the startups produce regenerated nylon turning waste problems into fashion and interior solutions, or they develop renewable inks fabricated through bioproduction to replace their toxic, non-biological and non-recyclable versions.

Using web-solutions or moving activities online has also been an important feature. Some 20% of startups are truly digital, for instance they provide innovative web solutions to promote digital weaving and dyeing, offer digital dressing that allows customers to try on clothes in online stores or simply create online platforms. While 9% of startups are focused on e-commerce specifically.

Figure 16: Type of startups in textiles in the EU27



Source: Technopolis analysis based on Crunchbase and Dealroom data

The importance of e-textile and wearable electronics is also apparent in the above statistics, with 11% of startups working in this field. Indeed, the convergence of textile and electronics will enable the integration of sensors into textiles.

The potential of smart fabrics, which can communicate with smartphones to process biometric information such as heart rate, temperature, breathing, stress, movement, acceleration, or even hormone levels, promises a new era for smart clothes balancing fashion, engineering, user experience, cybersecurity, design and science to reinvent technologies that can anticipate needs and desires<sup>47</sup>.

Startup activity in the textile industry will get a further boost thanks to the **InvestEU Programme** under the next long-term EU budget 2021-2027. The InvestEU Fund is expected to mobilise public and private investment in the EU to help address the still sizeable investment gap, with €15.2 bn earmarked. The InvestEU Fund will support research, innovation and digitisation as one of its stated objectives.

<sup>47</sup> Fernández-Caramés et Fraga-Lamas (2018). Towards the Internet of Smart Clothing: A Review on IoT Wearables and Garments for Creating Intelligent Connected E-Textiles



## Section 4

### 4. Skills supply and demand

#### Key messages

The European textile industry will need to make critical decisions to continue investing in reskilling and upskilling its personnel and face a new, even more digital era.

Within the registered professionals on LinkedIn employed in the textile industry, **Advanced Manufacturing** related skills represent the highest share in the EU27, reflecting a high demand for specialists with core skills. The second largest professional group is linked to relevant skills in the area of **Big Data** that reflects the importance of these skills in particular in trend and customer behavior analysis. Further prominent categories with high relevance for the European textile industry include technological skills related to **Cloud and Advanced Materials**, followed by AI and Security.

**Italy, Germany and France** are leading the list in terms of absolute number of professionals employed in the textile industry and with advanced technology skills. More specifically, professionals with Advanced Materials skills are most represented in Belgium, with Advanced Manufacturing and Robotics prominent in Italy, and AI skills in Germany.

In the past year (2018-2019), professionals with skills in **AI and IoT** followed by AR/VR, Security and Blockchain **were hired the most often** by companies in the textile industry.

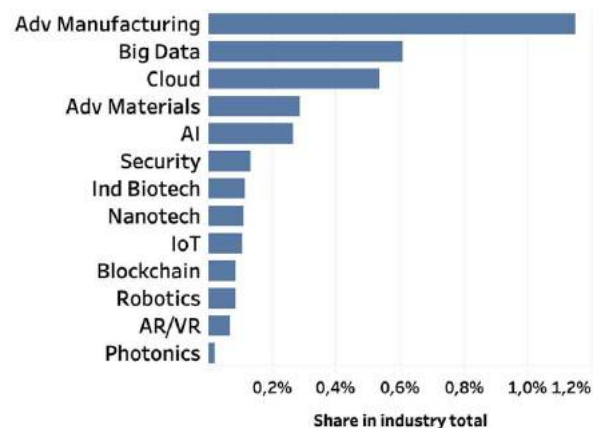
The most demanded skills by European textile firms in 2019 were related to **analytics, business intelligence, social media, inventory management**, as captured by LinkedIn data.

#### 4.1 Availability of new technological skills – prominence of Advanced Manufacturing

The textile industry encounters skill gaps due to its inability to adapt fast enough to rapid technological transformations. Other barriers include low mobility, an ageing workforce, and a mismatch between education and the needs of the industry<sup>48</sup>. The Covid pandemic has tested the sector but also provided an opportunity to upskill workers and prepare them for the new world of work, while factories and stores are being temporarily closed or operating with reduced capacity<sup>49</sup>.

Figure 17 illustrates the general distribution of technological skills in the textile industry across all EU27 countries, while Figure 18 displays the geographical distribution of these technological skills. Based on an analysis of LinkedIn<sup>50</sup> data, Figure 17 thus provides a picture of the supply of professionals with advanced technological skills relevant to the textile industry in 2019. Within the registered professionals on LinkedIn employed in the textile industry, **Advanced Manufacturing** tops the list in the EU27, reflecting the importance of this field and high demand for specialists with core skills.

Figure 17: Share of professionals with advanced technology skills employed in the textile industry in total technology skilled, EU27 (2019)



Source: Technopolis Group based on LinkedIn analysis

In second place, **Big Data** skills reflect the importance of business and customer data analytics in the apparel and textile value chain in Europe. These skills are particularly relevant in trend and customer behavior analysis.

<sup>48</sup> Eurostat, New Skills Agenda, 2016: [https://ec.europa.eu/growth/content/new-skills-agenda-blueprint-sectoral-cooperation-skills-1\\_en](https://ec.europa.eu/growth/content/new-skills-agenda-blueprint-sectoral-cooperation-skills-1_en)

<sup>49</sup> [https://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/documents/briefingnote/wcms\\_741642.pdf](https://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/documents/briefingnote/wcms_741642.pdf)

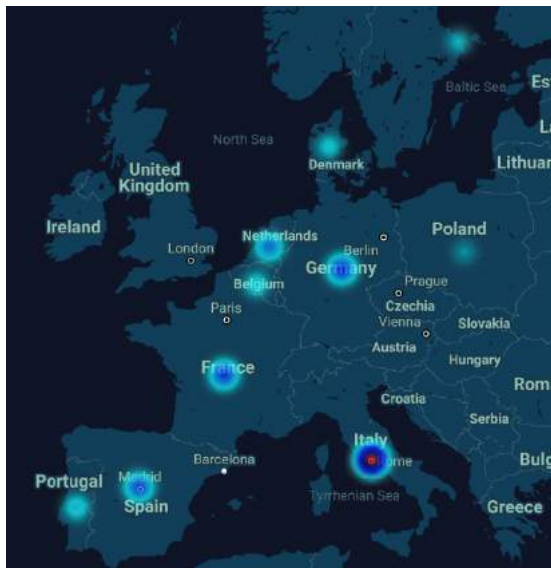
<sup>50</sup> To harvest the data from LinkedIn, keywords capturing skills by advanced technology have been defined and reviewed by technology experts. Queries have subsequently been constructed to filter the database by location and industry.



Further prominent categories with high relevance for the European textile industry include **Cloud and Advanced Materials skills, followed by Artificial Intelligence and Security**. Innovation in textile materials such as the development of organic cotton, jute, silk, kapok, hemp and wool need talented professionals who can drive the European textile industry towards low carbon and circular economy norms.

Figure 19 indicates that **Italy, Germany and France** are leading the list in terms of absolute number of professionals employed in the textile industry and with advanced technology (AT) skills. When we look at the share compared to total industry professionals (as captured by LinkedIn), we find **Germany, Finland and Italy** on the top followed by Belgium, Portugal and the Netherlands.

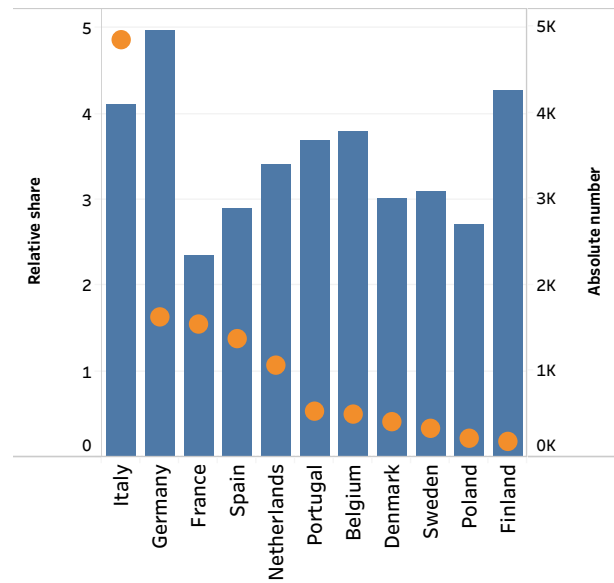
Figure 18: Concentration of professionals with advanced technology skills in the textile industry in the EU27



low high

Source: Technopolis Group based on LinkedIn analysis using geolytics map

Figure 19: Professionals on LinkedIn employed in the textile industry and with skills in advanced technologies, top EU27 countries



Colour legend

- Absolute strength - number of AT professionals in the textile industry
- Relative share of AT professionals in total textile industry

Source: Technopolis Group analysis based on LinkedIn

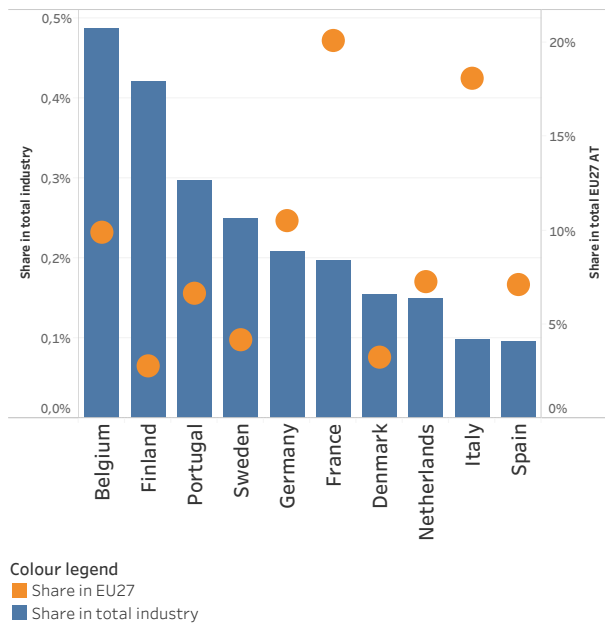
Note: Only countries with above median total industry professionals are displayed

In the next figures we highlight some of the relevant advanced technologies and depict the patterns of related skilled professionals employed in the textile industry. We will indicate both the absolute number of professionals with the specific skill (as registered on LinkedIn) and the relative share of the total industry professionals. This provides insight both into the overall strengths (i.e. which country has the most AI professionals in textiles) but also relative advantages (which country has the most professionals in AI relative to the people employed in the textile industry).

Figure 20 demonstrates the allocation of employees in the textile industry with technological skills related to **Advanced Materials** among the top EU countries. In terms of the relative shares within the total textile industry professionals, Belgium and Finland are leading the country list, followed by Portugal and Sweden (see Figure 20).



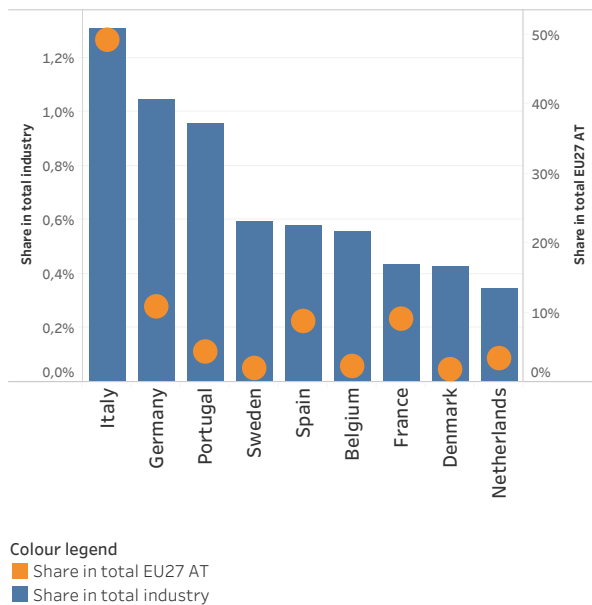
Figure 20: Textile industry professionals with skills in Advanced Materials among top EU countries



Source: Technopolis Group based on LinkedIn analysis

The increasingly automated production processes and robots used on textile plants require professionals with Robotics and Advanced Manufacturing skills. The strongest countries in this area as a share of the total industry professionals include Italy, Germany and Portugal, followed by Sweden and Spain (see Figure 21).

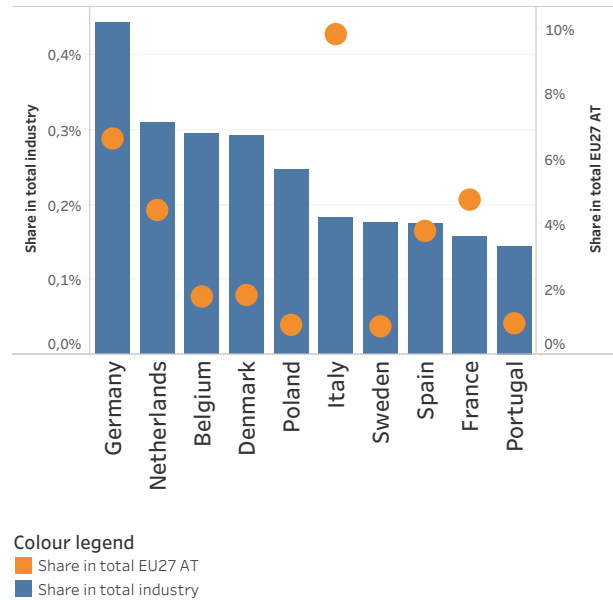
Figure 21: Textile industry professionals with skills in Advanced Manufacturing and Robotics in top EU27 countries



Source: Technopolis Group based on LinkedIn analysis

The share of professionals with **AI and Big Data** skills within the total number of professionals in the textile industry is the highest in Germany, the Netherlands and Belgium, as the analysis of LinkedIn data shows (see Figure 22).

Figure 22: Textile industry professionals with skills in Artificial Intelligence and Big Data in top EU27 countries, 2019



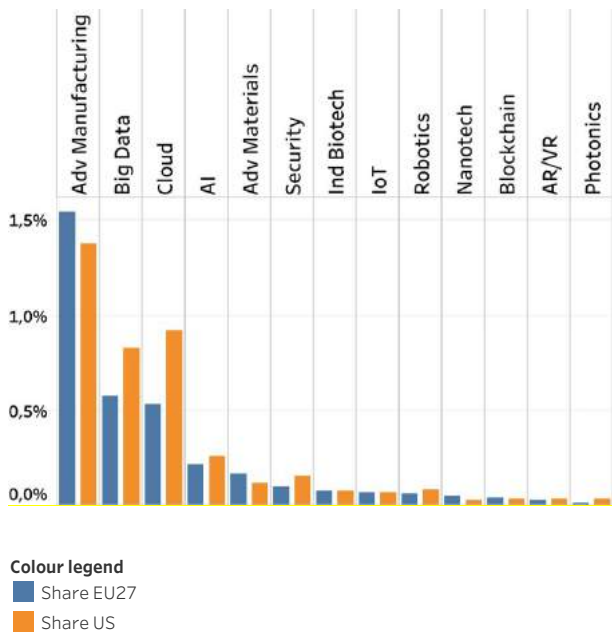
Source: Technopolis Group based on LinkedIn analysis

The next figure demonstrates the skills supply in advanced technologies across EU countries in comparison with the US.

As shown in Figure 23, the EU27 holds a higher share of professionals with skills in **Advanced Manufacturing, IoT, Nanotechnology and Blockchain** than the US. The results clearly demonstrate that the US has more AT professionals in Big Data, Cloud, Security than the EU27.



Figure 23: Textile industry professionals with skills in advanced technologies in the EU27 and US



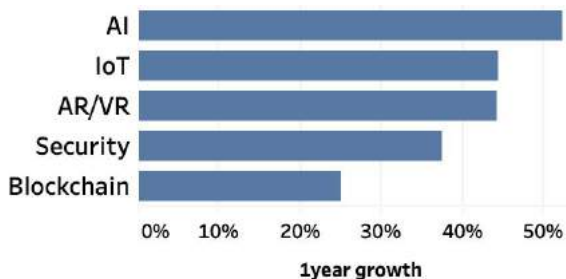
Source: Technopolis Group based on LinkedIn analysis

#### 4.2 Demand for new skills Big Data and AI

After analysing the availability of technological skills in the textile industry it is also important to look at which skills have been the most common in recent hires. In order to measure this demand, the one-year growth rate of technological skills can be analysed by comparing the skills indicated in 2018 and its change to 2019.

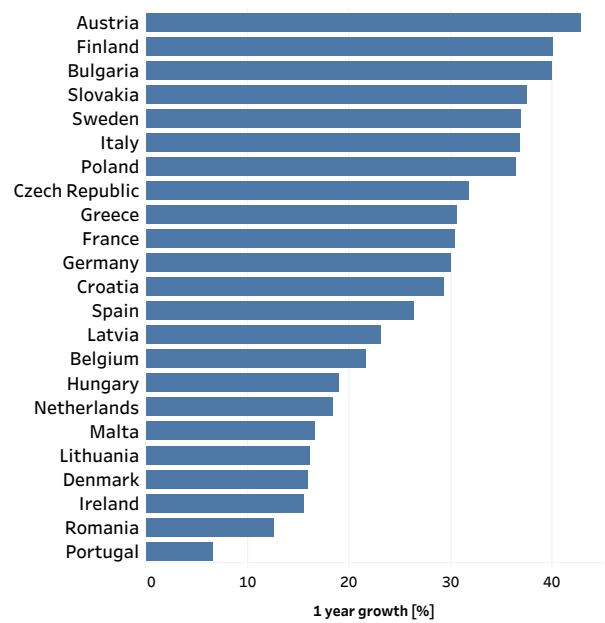
Figure 24 visualises the five technological skills that showed the highest growth within the last year (from 2018 to 2019) among EU27 countries. We see AI and IoT on the top followed up by AR/VR, Security and Blockchain.

Figure 24: One-year growth of top five skills



Source: Technopolis Group based on LinkedIn analysis

Figure 25: EU countries with highest one-year growth of AT professionals in the textile industry



Source: Technopolis Group based on LinkedIn analysis

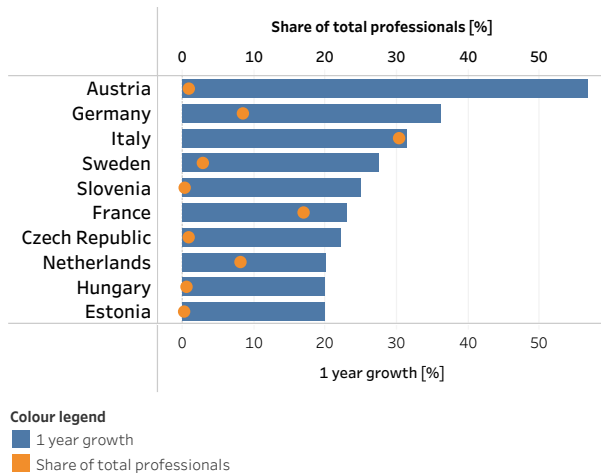
Figure 25 illustrates the general distribution of the one-year growth rate in technological skills as observed in the textile industry across all EU27 countries. Austria (+43%), Finland (+40%), Bulgaria (+40%) and Slovakia (+37.5%) experienced the highest rise in demand for professionals in advanced technologies.

The first widespread technological skills with high relevance for the textile industry – Advanced Manufacturing – show even more significant one-year growth rates for individual EU countries (Figure 26). According to available data, the rise in Advanced Manufacturing professionals was noteworthy especially in **Austria, Germany, Italy and Sweden**, as depicted in Figure 26.





Figure 26: EU countries with highest one-year growth of textile industry in Advanced Manufacturing



Source: Technopolis Group based on LinkedIn analysis

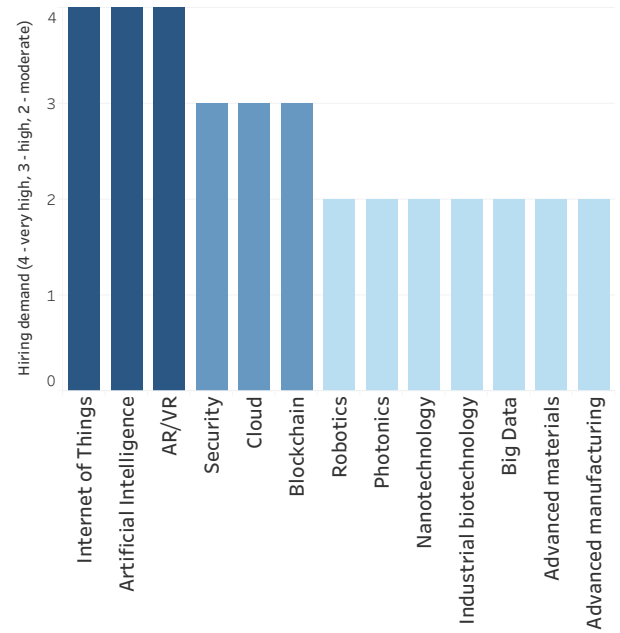
Figure 27: EU countries with highest one-year growth of Advanced Materials professionals in the textile industry



Source: Technopolis Group based on LinkedIn analysis

Technological skills in Advanced Materials is considered as one of the most relevant for the textile industry. Poland (+60%), Austria (+33%), Sweden (+25%) and France (+25.5%) experienced the highest increase in demand for professionals in this field of technology (see Figure 27).

Figure 28: Hiring demand in the textile industry, Dec 2019-March 2020



Colour legend  
 Very high  
 High  
 Moderate  
 Low

Source: Technopolis Group based on LinkedIn analysis

Based on the skills requirements listed in the jobs posted on LinkedIn by European textile industry firms, all advanced technology skills are demanded by the textile industry, but most importantly the IoT, AI and AR/VR skills have been in very high demand (see Figure 28). Hiring demand is defined as the share of job ads published on LinkedIn and requiring the specific skill.

The most demanded skills by European textile firms showing the greatest increase in 2019 were related to analytics, business intelligence, social media, and inventory management, as captured by LinkedIn data.

Nevertheless, soft skills and other non-technological skills are also highly relevant. For instance, in the case of the luxury textile and apparel sector, craftsmanship and related skills are highly regarded, as they play a critical role in the success of European companies on global markets. The European Cultural and Creative Industries Association (ECCIA) that represents the sector has highlighted the shortage of such skills and the need to take action<sup>51</sup>.

51

<https://www.eccia.eu/assets/activities/files/ECCIA%20Policy%20Recommendations.pdf>



## Section 5

# 5. Future outlook: challenges and opportunities

## 5.1 Moment of opportunity in reshaping value chains

As a consequence of Covid-19, customers' habits have profoundly changed when buying clothes (or placing orders for technical textiles), while travel restrictions have deeply shaken global supply chains. These new trends are forcing textile industry firms to revise their sourcing strategies and operating models. In the future, companies will need to rethink their partnerships, digitalise even more and gain new competitive advantage by nearshoring part of the production.

To overcome the current difficulties, according to a recent McKinsey report (2020)<sup>52</sup>, *"The industry needs to look ahead to the 'next normal' – and fundamentally reshape its sourcing practices."*

There is a need not just for more resilience, but also more agile supply chains that are fast, cost efficient and flexible in producing and delivering goods. European textile manufacturers might also expect a boost on the back of a new European trade strategy. The European Commission has recommended that the EU amends its trade agreements with partners in the Pan-Euro-Mediterranean region trade zone. It has adopted a package of proposals that aims to increase trade between the European Union and neighbouring countries in the Pan-Euro-Med region, thereby contributing to the economic recovery following the coronavirus outbreak<sup>53</sup>.

## 5.2 Fight for sustainable and ethical textiles

Textile industry companies might have other immediate concerns, nevertheless sustainability and ethical production practices remain very important for customers and the industry as a whole. Ecologically produced textiles could be seen as a 'white space' for growth opportunities in the industry.

The way forward is underlined by the EU Green Deal<sup>54</sup> and Circular Economy package, as political priorities, and making comprehensive changes to textile value chains. These changes will not only lead towards a fairer and more sustainable textile sector, but also to a more resilient one, which is

better equipped to overcome challenges in the future. Textile companies will need to focus on energy efficiency and emission control as overall quality measures will be more and more concentrated on environmental standards<sup>55</sup>. The shift towards more sustainable solutions is an international challenge. As long as customers prefer lower costs, competition with Asian countries will remain strong.

## 5.3 AI-enhanced personalisation and virtual experiences

Artificial Intelligence, AR/VR and Big Data technologies will play a crucial role in renewing the textile industry. Consumers will increasingly look for convenience, personalisation, and evidence of sustainable and healthy materials, with online shopping becoming much more common.

On the one hand, European textile industry will need bolder investments in technology that helps the online world mirror in-store experiences. With the emphasis on "experiences over objects"<sup>56</sup>, digital technologies will support the creation of new services and different forms of engagement with customers.

On the other hand, AI and related equipment with sensors and the Internet of Things will be necessary to deal with large inventories and develop data-driven distribution centres.

## 5.4 Need for better skills

As highlighted earlier, upskilling the workforce will be a pillar for developing new competitive advantages in a more digital post-Covid era. New skills are demanded across the entire textile industry, especially in areas such as production processes, design, finance, product development, logistics, marketing, sales, and customer service. Skilled workers with advanced technology and digital knowledge will be in particularly high demand across all countries<sup>57</sup>.

Support to more vocational education programmes for textiles, at national or regional level will be highly relevant in order to facilitate digital and technological skills.

<sup>52</sup> McKinsey (2020). Time for change: How to use the crisis to make fashion sourcing more agile and sustainable

<sup>53</sup> [https://ec.europa.eu/commission/presscorner/detail/en/ip\\_20\\_1515](https://ec.europa.eu/commission/presscorner/detail/en/ip_20_1515)

<sup>54</sup> <https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal>

<sup>55</sup>

[https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/633143/EPRS\\_BRI\(2019\)633143\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/633143/EPRS_BRI(2019)633143_EN.pdf)

<sup>56</sup> <https://blog.euromonitor.com/can-ai-and-technology-help-fashion-retailers-during-coronavirus/>

<sup>57</sup> International Labour Organisation, 2019



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## About the 'Advanced Technologies for Industry' project

The EU's industrial policy strategy promotes the creation of a competitive European industry. In order to properly support the implementation of policies and initiatives, a systematic monitoring of technological trends and reliable, up-to-date data on advanced technologies is needed. To this end, the *Advanced Technologies for Industry* (ATI) project has been set up. It provides policymakers, industry representatives and academia with:

- Statistical data on the production and use of advanced technologies including enabling conditions such as skills, investment or entrepreneurship;
- Analytical reports such as on technological trends, sectoral insights and products;
- Analyses of policy measures and policy tools related to the uptake of advanced technologies;
- Analysis of technological trends in competing economies such as in the US, China or Japan;
- Access to technology centres and innovation hubs across EU countries.

You may find more information about the 16 technologies here: <https://ati.ec.europa.eu>.

The project is undertaken on behalf of the European Commission, Directorate General for Internal Market, Industry, Entrepreneurship and SMEs and the Executive Agency for Small and Medium-sized Enterprises (EASME) by IDC, Technopolis Group, Capgemini, Fraunhofer, IDEA Consult and NESTA.

