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Textiles and Clothing Manufacturing: Vision for 2025 and Actions Needed

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Textiles and Clothing Manufacturing: Vision for 2025 and Actions Needed
This foresight study used a qualitative methodology engaging with a wide variety of stakeholders to define a 2025 vision for the European textiles and clothing manufacturing industry and propose actions addressing challenges related to trade, innovation, resources and skills.

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Executive summary

Context and objectives

This project is set in the context of the European industrial policy objective declared in 2010 to bring the share of industry in EU GDP from 15 to 20 per cent by 2020. It applies the Industrial Landscape Vision 2025 (ILV_{2025}), a forward looking tool developed in a previous JRC foresight study and endorsed by DG GROW and its Task Force on advanced manufacturing. This tool provides a generic model of industry in Europe 10 years from now.

The main objective of the project is to understand the long-term needs and challenges faced by European industry, to develop a vision for identifying key opportunities and challenges, and to develop potential responses by industry actors and policy makers.

Methodology

The project developed a five-step inclusive and participatory process that takes a maximum of 6 months to implement, including two workshops engaging a broad range of stakeholders linked to the topic. Step 1 is to select a manufacturing sector of interest. Step 2 is dedicated to engaging with the selected sector and its stakeholders and recruiting study participants. Step 3 is to identify and understand the key drivers of change for this sector and to create a long-term (10-15 years) vision for it with the help of the ILV_{2025} (Expert Workshop n°1). In Step 4, the main challenges and opportunities faced in achieving this vision are identified. Finally, in Step 5, participants develop the most desirable responses to these challenges from both the industry perspective and the policy perspective (Expert Workshop n°2). This takes place through the engagement of a broad range of stakeholders from the selected industry sectors and beyond.

The case on textiles and clothing

Despite the offshoring of much of the EU textile production, the European textile sector still represents 2.4% of EU manufacturing employment and 1.4% of EU manufacturing value added. It is also mostly made up of SMEs widely distributed across many Member States. These SMEs find it difficult to allocate the time and human resources necessary to assessing the prospects of buying advanced machinery, let alone the finances and the required skills. In addition, some operations in the sector, in particular sewing, are difficult to automate. The sector is also facing technical standards barriers for the widespread application of technical textiles and is suffering from the loss of traditional skills and difficulties to attract new skills.

Opportunities could come from the development of new service-based business models, of new textiles supporting new services and from the application of technical textiles across a growing range of sectors (e.g. automotive). As the sector is fragmented across a multitude of very specialised SMEs, a better integration of the supply chain would also bring large benefits.

Key conclusions

The study suggests a range of possible policy actions to address the identified challenges.

The **vision statement** states that, by 2025 the textiles and clothing industry, including fibre-based materials, clothing, home and technical textiles, will be a strategic EU industry sector providing innovative and competitive products enabling personalised, adaptable and attractive solutions, integrating services for very diverse, informed and demanding consumers and businesses. It states further that the sector will operate according to a globalised and efficient circular economic model that maximises the use of local resources, exploits advanced manufacturing techniques and engages in cross-sectorial collaborations and strategic clusters. It will implement profitable and inclusive business models and attract skilled and talented entrepreneurs and employees.

Four clusters of **challenges** were identified as relevant for the sector to reach its vision, along with appropriate **policy actions** to address them:

(1) **Innovation**

In this area, the participants called mainly for support to understand better customers in emerging markets, especially for customised products, for support for techno-infrastructural developments (e.g. 'scan shops', transport, delivery, knowledge sharing, etc.) and for European harmonisation of VAT, e-commerce regulations and improved (sustainable) transportation.

It also appeared that collaboration with other sectors and universities, the development of standards, the need for research grants and tax relief for smart textiles is also necessary. The establishment of networks and financing for the development of service based business models would also be useful as well as the funding of demonstration projects for manufacturing technologies.

(2) **Resources**

Resources and raw materials are a key issue for any manufacturing sector and the sourcing of materials must be facilitated as much as possible. In a circular economy perspective, the sector called for preventing used textiles and recycled fabric from leaving the EU. In this respect, it would be useful to facilitate the traceability of materials and encourage demand for recycled content.

Protect recyclers from the volatility of virgin raw materials prices.

Support pilot projects for recycling.

Adjust energy taxation to favour recycling.

Invest in infrastructure for used textiles collection, sorting and recycling.

Support the development of technologies for recycling.

Invest in biotech research to develop local renewable textiles raw materials.

Act in collaboration with all stakeholders to improve the acceptability of GMOs by the public.

Develop marks and certification schemes.

Develop textiles credit scheme on the model of carbon credits.

(3) **Trade**

Offer financial incentives (e.g. tax breaks) to actors adopting production methods that maximise social and environmental benefits emphasising quality and value over European identity and sustainability.

Harmonise standards and testing techniques across the US and EU markets (or agree mutual recognition), while negotiating a smoother flow of goods between the two trading blocs.

Ensure adequate implementation of current rules and regulations, e.g. by equipping customs offices with current technology to verify compliance with standards and check products' authenticity.

Take initiatives in the area of product standards to make life more difficult for counterfeiters, e.g. by promoting voluntary standards for smart labelling to help consumers become accustomed to checking products' origins and lifecycles.

Reduce tariffs and the burdens of custom management to support firms expanding into emerging markets.

(4) **Skills**

Support translation and adaptation of technical courses to make them more broadly accessible and support sending employees from textiles companies away for extended periods of time to undergo extra training.

Support more vocational education programmes for textiles, at national or regional level, as relevant;

Facilitate links between universities, trade schools and firms.

Fund initiatives for knowledge transfer and develop tax incentives to encourage young people become co-owners of textile firms.

As textile intensive regions are often rural, local governments could support infrastructural developments (e.g. housing, public transport) to make it easier for young people either to move and settle in these areas or to commute more easily from urban centres.

Set up progressive retirement schemes and flexible retirement arrangements to facilitate the transfer of know-how from the old generation to young textile workers.

Develop standards on, for example, labelling to encourage faster action on data management across the sector.

Regional support for the development of specialist and strategic networks connecting different firms and educational institutions to develop the next generation of workers.

1 Introduction

This project is set in the context of a new impetus for European industrial policy. Since 2010, the European Commission has been calling for strategic, smart, inclusive and sustainable growth. In 2015, restoring the strength of European industry has been presented as a crucial part of our response to the economic crisis. The first of the ten priorities of President Juncker's political guidelines is *a new boost for jobs, growth and investment*, including the creation of favourable conditions for revival of European industry. The fourth is *a deeper and fairer internal market with a strengthened industrial base*. The target is to bring the share of industry in EU GDP from 15 to 20 per cent by 2020, ensuring that Europe maintains global leadership in strategic sectors with high-value jobs.

The European Commission's Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW) has already worked on the identification of barriers to the uptake of manufacturing technologies[1]. In 2016, it has also taken the initiative to launch a platform[2] that brings together the various actors from the Commission and beyond to promote industrial modernisation at regional level and to support the efforts of EU regions committed to work together for developing a pipeline of investment projects related to industrial modernisation.

In this context, it is necessary to understand the long-term needs and challenges faced by European industry, to develop a vision for identifying key opportunities and challenges, and to develop potential responses. The main objective of this project is to provide a way to achieve this. The approach uses the Industrial Landscape Vision 2025 (ILV_{2025}), a forward looking tool developed in a previous JRC foresight study[3] and endorsed by DG GROW and its Task Force on advanced manufacturing[4]. This tool provides a generic model of industry in Europe 10 years from now. It is composed of three layers, describing the production and consumption system, the factors – such as skills, markets, resources, and regulation – that can either enable or constrain the evolution of the industrial landscape, and the key political, economic, social, environmental and technological drivers that shape the industrial landscape.

One key objective of this project is to transform the conceptualisation of European industry presented in the ILV_{2025}, into a tool that can be applied to European manufacturing sectors. This tool can then be applied to understand the future drivers shaping the sector so as to develop a vision for 2025, identifying also key opportunities and challenges and developing responsive actions. In addition to generating strategic intelligence for policy, industry and other actors, the implementation of the tool will also provide a space for interactive engagement between several stakeholders. The tool is being developed iteratively in the course of two case studies of European manufacturing sectors: the textiles and clothing industry and the non-ferrous metals industry. As such, the project will deliver both timely insights for policy and industry initiatives and a repeatable process. It will also provide a set of materials that can enable further research with other industrial sectors in the future.

We developed a five-step process that takes a maximum of 6 months to implement, including two expert workshops. Step 1 is to select a sector of interest. Step 2 is dedicated to engaging with the selected sector and its stakeholders and recruiting study participants. Step 3 is to identify the key drivers of change for this sector and to create a long-term (10-15 years) vision for it. In Step 4, the main challenges and opportunities faced in achieving this vision are identified. Finally, in Step 5, participants develop the most desirable responses to these challenges from both the industry perspective and the policy perspective.

This document only reports on the part of the study relating to textiles and clothing. Two other reports cover the methodology and the case on non-ferrous metals manufacturing and it aims at providing a more detailed description of the ILV_{2025}, outlines briefly the objectives and process adopted (Section 3), describes the outcomes of the process for the textile and clothing sector (Section 4) including practical recommendations and finishes by posing some overall recommendations and conclusions (Section 5).

[1] European Commission (2016). An analysis of drivers, barriers and readiness factors of EU companies for adopting advanced manufacturing products and technologies, ISBN: 978-92-79-64467-2. https://bookshop.europa.eu/en/an-analysis-of-drivers-barriers-and-readiness-factors-of-eu-companies-for-adopting-advanced-manufacturing-products-and-technologies-pbET0716158/

[2] http://s3platform.jrc.ec.europa.eu/industrial-modernisation

[3] https://ec.europa.eu/jrc/en/research/foresight/ilv2025

[4] European Commission (2014) *'Advancing Manufacturing - Advancing Europe'* - Report of the Task Force on Advanced Manufacturing for Clean Production, Commission Staff Working Document SWD(2014) 120 final, Brussels, 19.3.2014

2 Background and context

Since 2010, industrial policy at EU level has received a new impetus. The Commission Communication *EUROPE* 2020, a strategy for smart, sustainable and inclusive growth (COM/2010/2020 final) argued that sustainable growth means building a resource efficient, sustainable and competitive economy, exploiting Europe's leadership in the race to develop new processes and technologies, including green technologies, accelerating the roll out of smart grids using ICTs, exploiting EU-scale networks, and reinforcing the competitive advantages of our businesses, particularly in manufacturing and within our SMEs. Two years later, the strategy became more specific, with the Commission proposing to jointly focus investment and innovation on six priority action lines, including advanced manufacturing technologies for clean production, which were seen as a key part of the new industrial revolution (COM/2012/0582 final).

By 2014, the Commission called for a European Industrial Renaissance[5] which would foster growth and competitiveness, sustain and strengthen recovery, and achieve the goals of the Europe 2020 agenda, in particular 20% greenhouse gas emission reduction compared to 1990 and 20% increase in energy efficiency by 2020. At this point, while remaining a world leader in several manufacturing sectors, the European Union has seen its manufacturing sector decline as a consequence of the economic crisis. As noted by the Task Force, over 3.8 million jobs were lost and industrial production decreased. Given the ambitious European social goals and the limited natural and energy resources available in the EU, the Commission argued that Europe should position itself in the segment of high value-added goods and services. Digital technologies are seen as key to this competitiveness, with industrial policy capitalising upon cloud computing, big data and data value chain developments, new industrial applications of internet, smart factories, 3-D printing and design.

In 2016, restoring the strength of European industry is considered a crucial part of the European response to the economic crisis. The first of the ten priorities of Juncker's political guidelines is *a new boost for jobs, growth and investment*, including the creation of favourable conditions for revival of European industry. The fourth is *a deeper and fairer internal market with a strengthened industrial base*. The target is to bring the share of industry in EU GDP from 15 to 20 per cent by 2020, ensuring that Europe maintains global leadership in strategic sectors with high-value jobs. One of the mechanisms for achieving this is investment in new technologies.

The Taskforce reported that European producers of advanced manufacturing technologies have a strong position on the global market because of the quality of their products. The EU's global trade share in advanced manufacturing technologies is 38%, and 50% in robotics and factory automation. However, the sector relies heavily on exports, with just 25 % of sales in Europe. This is risky, because the distance from their main markets might affect ongoing innovation and future competitiveness. It also indicates that, while there is no shortage of producers of advanced manufacturing technologies, EU industry is falling behind in their adoption. For advanced manufacturing to have a real impact on wider European industry, beyond the sector that produces advanced manufacturing technologies themselves, we will have to see much broader uptake of advanced manufacturing technologies by European manufacturers.

2.1 Advanced manufacturing

There are several definitions of advanced manufacturing in the literature. We are adopting here the definition developed by the European Taskforce on Advanced Manufacturing, which defined its scope as "*manufacturing technologies and production processes which have the potential to enable manufacturing industries to improve productivity (production speed, operating precision, and energy and materials consumption) and/or to improve waste and pollution management in a life-cycle perspective*".[6] This extends beyond traditional manufacturing technologies to include digital and ICT enabled technologies (such as industrial internet and big data).

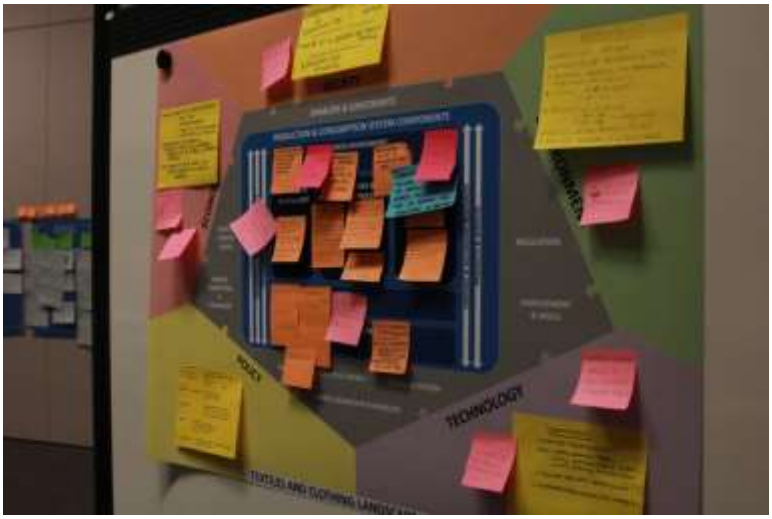
In line with the Europe 2020 strategy, the present project is particularly interested in advanced manufacturing to support the development of clean and competitive manufacturing in Europe. This includes technologies and processes that can provide high-value jobs, boost the EU economy, and promote energy and resource efficient manufacturing (Europe 2020 targets). They may improve environmental performance or economic efficiency,

[5] European Commission (2014). Communication - For a European Industrial Renaissance, (COM/2014/014 final)
[6] European Commission (2014). Staff Working Document - 'Advancing Manufacturing - Advancing Europe' - Report of the Task Force on Advanced Manufacturing for Clean Production.

allow the use of a wider range of materials or bring new flexibility to the manufacturing process and an increased ability to customise products and processes.

2.2 Industrial Landscape Vision 2025

The *Industrial Landscape Vision 2025* (ILV_{2025})[7] results from a past foresight exercise[8] and provides a generic model of industry in Europe 10 years into the future. It is composed of three closely interrelated layers. Starting from the outside of the ILV_{2025} diagram, reproduced in Figure 1, below, the first layer presents the agents of change. These are the driving forces that will shape the industrial landscape, including 108 trends organised into policy, economy, society, environment and technology. The second layer is comprised of enablers and constraints. Factors – such as skills, markets, resources, and regulation – that can either enable or constrain the evolution of the industrial landscape. They are influenced by the agents of change and can act as 'levers' in determining the direction and development of the different components of the production and consumption system. These are found in the grey area of the diagram, between the agents of change and the production and consumption system. In the third layer, the production and consumption system is the heart of the industrial landscape. It describes the key elements that will determine how people are going to produce and consume in 10 years into the future. The components of this system – such as infrastructure, business environment, and materials – are strongly affected by, and linked to the agents of change and the enablers and constraints. These are found at the centre of the ILV_{2025} diagram. In this project, the ILV_{2025} is used as a basis to develop sectorial visions for the industrial sectors of interest.



[7] https://ec.europa.eu/jrc/en/research/foresight/ilv2025
[8] http://publications.jrc.ec.europa.eu/repository/bitstream/JRC94793/lbna27210enn.pdf

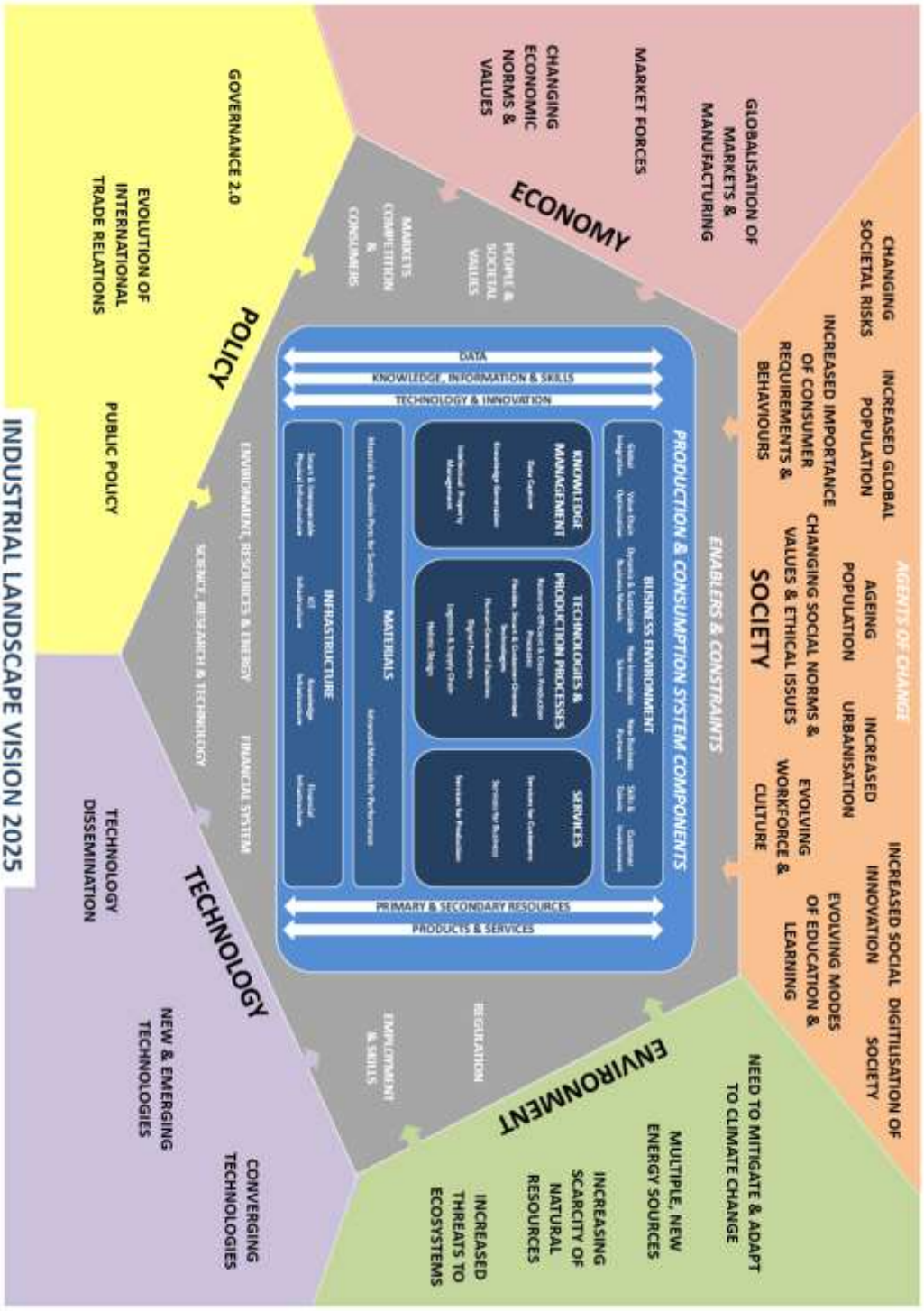


Figure 1: The Industrial Landscape Vision 2025

3 Objective and process of the project

The main objective of the project is to provide one way to understand the long-term needs and challenges faced by European industry, to develop a vision for identifying key opportunities and challenges, and to develop potential responses by developing a process to engage with industrial sectors and EU policy makers.

To achieve this, the project is using the forward looking ILV_{2025} described in the previous section, as a tool to develop a method for working with European manufacturing sectors to understand the long-term needs and challenges faced, to develop a vision for identifying key opportunities and challenges, and to develop potential responses through engagement with a range of stakeholders. As well as generating strategic intelligence for policy, industry and other actors, the implementation of the method also provides a space for interactive engagement between several stakeholders.

The method is designed to work with case studies of various European manufacturing sectors. The present project foresees two case studies: textiles and clothing and non-ferrous metals. These two cases were selected and implemented not only to provide timely insights for policy and industry initiatives, but also to maximise support for the design, development and testing of the method itself. While the delivery of these insights should be of immediate value to policy and industry stakeholders, the project aims at delivering the method – in the form of a set of materials and a repeatable process – to enable others to engage with other industrial sectors in the future. Of course, the method and tool can be the object of further research for additional refinement and possible combination with quantitative approaches.

Considering the future of European industrial sectors through the lens of the ILV_{2025} allows us to explore how various social, economic, political, technological and environmental trends affect European manufacturing industry and the challenges and opportunities that this changing landscape will present. It also supports the identification of opportunities for action to support these sectors in the context of the 20% of EU GDP by 2020 target for industry. The core process is designed to ensure that its key structural features are applicable to European industry quite generally, and defined so that it can be readily repeated for any sector of interest.

We developed a five-step process that takes around 6 months to implement, including two expert workshops with strong involvement of key actors from the selected sectors. Step 1 consists in the identification of a sector of interest. Step 2 is dedicated to engaging with the selected sector and its stakeholders and recruiting study participants. Step 3 consists in using the ILV_{2025} as a tool to understand the key agents of change for the sector and to create a long-term (10-15 years) vision for it. In the fourth step, the participants in the process identify the main challenges and opportunities faced in achieving this vision. Finally, in step 5, participants develop the most desirable responses to address these challenges and seize these opportunities both from the industry partners and from policy makers. In this document we illustrate the outcomes of the process applied to the case study of European textile and clothing.

The full details of the approach and how to apply it will be described in a separate report.

4 Case Study: Textiles and Clothing

4.1 Identifying a sector of interest: textiles and clothing

The first task of the case study was to gather an understanding of the characteristics of the sector on the basis of figures from DG GROW and EURATEX. According to these sources, in 2014, the European textile and clothing industry had a turnover of €165b and investments ~€4b. Responding well to the economic crises, the sector employs 1.6m workers across 173,000 companies. Additionally, €43b worth of European textile and clothing products were exported, and €99b imported from extra-European markets. The following points show how the textile sector was well aligned with the criteria identified in section 4.1:

- **Role and significance of the sector in the EU economy**. Despite the offshoring of much textile production, the European textiles sector still represents 2.4% of EU manufacturing employment and 1.4% of EU manufacturing value added. It is also widely distributed across many EU Member States.
- **Profile/structure of industry**. 3% of all EU manufacturing enterprises are textile-based, 90% of which have less than 50 employees. Many of these firms are ready to adopt advanced manufacturing technologies, but lack the resources to fully benefit from the opportunities in the trans-European market.
- **Manufacturing/technology intensity**. Textiles are at once traditional and modern. Since the industrial revolution, the textile sector has been driven by the adoption of cutting edge technologies. Now, it is well poised to take advantage of key emerging technologies such as ICT, big data, nanotechnologies and additive manufacturing to create novel products and to revolutionize current production processes.
- **Future potential:** While the sector has witnessed a major wave of offshoring over the last decades, rising labour and manufacturing costs in Asia and long delivery times have already pushed some production back to Europe ('re-shoring'). Further re-establishment of high-tech European manufacturing (ICT enabled, local customisation) is expected to offer high value-added activities with substantial opportunities for skilled employment.
- **Engagement potential:** In Euratex, the European Federation of National textile Trade Associations, the sector has a competent and reliable representative that brings together the European sector. Crucially, they are active in exploring the future of the sector and in promoting technological and non-technological innovations to modernise and boost their global competitiveness.

4.2 Understanding the sector and developing a long-term vision

During the first step of the case study, we began to understand the structure, dynamics and positioning of the sector, and to identify its key actors. We initiated a working relationship with Euratex, which offered crucial support throughout the case study especially in helping identifying and reaching out the stakeholders to involve in the study. In total we have approached more than 100 stakeholders from the textile and clothing sectors and 60 experts and stakeholders from allover Europe were actively engaged in two participative workshops, in providing evidence on the future vision for the textile and clothing sector and in identifying the challenges and opportunities that the sector is facing in achieving the vision.

The Textile and Clothing Vision sector **(TLV_{2025})** and a full vision narrative was developed during the first interactive workshop. We present the vision statement and its narrative that expands each of its key elements into longer descriptions. This was further developed through interviews and discussions with the participants and other stakeholders via email and an online community which was set up for the purpose.

Box 2. Vision statement for the European textiles and clothing industry

By 2025 the textiles and clothing industry, including fibre-based materials, clothing, home and technical textiles, will be **a strategic EU industry sector** providing innovative and competitive products enabling **personalised, adaptable and attractive solutions**, **integrating services** for very **diverse, informed and demanding consumers and businesses**.

It will operate according to a globalised and efficient **circular economic model** that maximises the use of local resources, exploits **advanced manufacturing techniques and engages in cross-sectorial collaborations and strategic clusters**. It will implement **profitable and inclusive business models** and attract **skilled and talented entrepreneurs and employees**

Strategic EU industry sector

Today, the sector counts 185,000 companies, mostly SMEs, employing 1.7 million people (6% of EU employment) generating a turnover of EUR 166 billion (3% of EU value added) widely spread across the EU. However, a substantial portion of (mostly lower added value) textiles and clothing consumed in the EU is produced elsewhere in the world, often in Asia, taking advantage of very low labour costs. Disadvantages of this model include long-distance supply chains, poor working conditions in "sweat-shops", and high environmental costs.

The textile and clothing industry can reinforce its strategic position as a key sector of the European industrial landscape by responding actively to key social, economic, environmental, technology and policy trends. Reinforcing the textile and clothing production base in the EU would offer opportunities to address these issues. Advanced manufacturing technologies offer the possibility to develop production systems which are cleaner, less labour and resource intensive and more circular (where the production and consumption system is designed to cycle resources, reducing waste and dependence upon raw materials). EU based production would also offset the risks and costs associated with long-distance supply chains and offers the opportunity of short delivery times, thereby providing enhanced possibilities for on-demand and customised production. The integration of ICT and big data analysis in business processes also make it possible to enhance consumer involvement, co-design, personalisation and servicisation of textile products.

The strategic value of the EU textile sector could be strengthened through penetration of textile-based materials into new hi- and low-tech markets, often in applications traditionally dominated by plastics, metals and other materials.

Personalised, adaptable and attractive solutions

Thanks to new agile production technologies, it will be easy to personalise textile products for individuals and niche markets, and to further adapt products after purchase, in response to changing needs and preferences.

Current technologies and production processes in the textile industry already allow 'mass customisation' to some extent, but robotics, digital and additive manufacturing and other 'smart' technologies will enable textile factories to increase their ability to deliver customised and personalised products within the paradigm of industrial production. In the world of ubiquitous computing and connectivity, smart textiles will become increasingly important. Fashion consumers will increasingly use digital tools to participate in the production process. These will require the textile industry to adapt business models (e.g. for co-design, co-development or even co-production with consumers) and to develop its data and knowledge management capacity.

Demand for these products begins with fashion ("I want *those* shoes, in *this* colour") but come increasingly from specific needs for functional and technical textiles (e.g. for medical care, engineering applications, personal protection and sporting goods). This could also drive production closer to market to reduce delivery times and enable co-production. Greater customisation is also about regional market variation. As data capture and analytics offer enhanced market vision, production runs can be optimised for specific locations (cities, regions) or groups (professionals, hobbies, fashion...).

Integrating products and services

There are already long standing traditions for textile services, such as rental of work wear, protective clothing or clothing for special occasions, the provision of towels and linen in restaurants, hotels, or hospitals. New initiatives are emerging, and clothing, technical and home textiles products will be increasingly bundled and offered as consumer or business services as an alternative to outright purchase. This is driven by increases in the functionalization of all kinds of textile products, the emergence of platforms to enable service models, and changing consumer norms and values.

The servicisation of textiles is much more than the replacement of ownership with rental and subscription models. The movement can be closely tied with a circular model, where products are leased on a long-term basis, and the materials can be broken down and rebuilt for the subsequent user.

Finally, textile products with embedded sensor and connectivity capabilities could also play a role in other kinds of services, for example in the provision of specialist products to support body monitoring for health, wellbeing and fitness. This field could also lead to the development of emotional and experiential textiles, integrating biosensors into smart clothing linked with emotional states.

Diverse, informed and demanding customers and businesses

The way people shop for all kinds of products is changing dramatically. Physical shops are gradually losing ground to online shopping and virtual environments. For textiles, this is particularly relevant for clothing and we see rapid development and integration of knowledge and data management tools to ensure customer expectations for fit and look of products, with resulting decreases in the return rate for products bought online.

Knowledge and data management are crucial in meeting the demands of modern consumers. All kinds of consumer choices are increasingly facilitated by a range of digital platforms for rating and reviewing products. This allows consumers to consult insights from producers, retailers, traditional 'expert reviewers', strangers who bought the same product, and peers via social media when making decisions about purchases. Even where price remains the primary factor, consumers increasingly expect to be able to trace and understand each product's geographic, human and environmental history. New platforms and enhanced functionality enable a shrinking gap between textile producers and consumers, with opportunities for personalisation and co-production, enabling the sector to respond to niches and trends (such as ageing society and self-tracking) with a range of products and services.

Data and knowledge management techniques are also used by textile and clothing producers for several purposes, including process optimisation, new product development, and market analysis. The use of sensors and RFID tags across supply chains supports the tracking and tracing of products from raw material processing, through customisation to delivery, increasing supply chain transparency and portfolio management. Embedded sensors also present opportunities for new products in health care, protective equipment, interior textiles, automotive and other technical applications. Taking full advantage of these opportunities will require improvements in data management and visualisation, event processing techniques and trend analysis, all requiring specialist expertise. New challenges could also emerge in security, privacy and intellectual property protection.

Circular economic model

Policies to adapt to and mitigate climate change will also create pressure on energy use, driving energy efficiency and a move away from fossil fuels. Today, the European textiles industry is largely dependent on imports for both synthetic and natural fibres, especially cotton. In the future, as world population grows, demand for raw materials and food will increase, increasing competition not only on markets for fibres but also for land. This will affect EU textiles material supply and incentivise optimum use of local resources, either through the use of bio-based man-made fibres, alternative natural fibres such as wool and linen, or through recycled textiles.

Massive amounts of increasingly complex data from machinery, processes, products and consumers will enable manufacturing firms to understand better and optimise all stages of their value chains, from design to distribution including supply chain management, production processes and marketing. This can lead to significant waste reduction.

Reclaimed fibres from post-consumer textile waste and re-spun into new yarn (source: Texperium)

Advanced manufacturing techniques

Robots with increased dexterity and intelligence, as well as the capability to work safely alongside humans, will enable textile and clothing factories to optimise their production processes. This, combined with innovation in consumer roles will lead to a more high-tech industry, requiring a smaller number of employees but with higher skill requirements.

Through advanced manufacturing techniques, customisation and personalisation is achieved within the paradigm of industrial production. One approach is for two-step production, with a range of basic elements produced *en masse* before final products are assembled with design features added according to customer specifications. A second is smart production technologies, which offer more rapid and automated configuration and a lower cost associated with reducing the lot size of a specific run of goods to the point that we hear increasing reference to 'lot size: 1'. Emerging digital and additive manufacturing could also enable a new generation of adaptable textile products which can be adjusted by the consumer according to changing needs and preferences, altering design features, circuitry and other functional elements.

Cross-disciplinary collaboration and strategic clusters

Cross-sectoral collaboration and strategic clusters are key to responding to the challenges and opportunities facing the SME-heavy EU textile and clothing industry. Strategic clusters emerge, taking advantage of local situations to develop capacity to produce energy and water, build resilient material resource bases, and pooling skills in areas such as material or production expertise, creative potential or data analytics. Collaboration with customers (co-design/co-development/co-production) drives higher value products and responsiveness to emerging trends and niches. Collaboration across sectors and disciplines leads to new products, and the use of textiles in a much wider range of application areas such as medicine and construction, which will require interdisciplinary expertise. Collaboration with educational institutions will also be required to ensure a new generation of workers and managers are prepared for successful careers in advanced EU-based textile production.

Profitable and inclusive business models

The sustainability of Europe's textile and clothing industry depends upon continued profitability. This will require progress with resource efficiency and product quality and adaptation to evolving customer needs. Digital platforms make it possible to understand shifting customer demands, to support mass customisation and to develop alternative models of (co-)production and consumption. Textile and clothing companies will have to find new positions and roles in changing industrial value chains or networks and clearly define their value propositions vis-à-vis their customers and end consumers.

Attracting skilled and talented entrepreneurs and employees

The shift towards advanced manufacturing technologies and concepts will lead to a production paradigm that is less labour-intensive and more skills-intensive. The direction of the sector calls for a new generation of employees and entrepreneurs that are ready to operate in the factories of the future, to manage data and knowledge at unprecedented scales, and to forge effective collaborative partnerships based upon cross-disciplinary understanding.

4.3 Identifying Challenges and Opportunities for the Textiles and Clothing sector

The next step of the process is to identify challenges and opportunities facing the sector in achieving the vision. For the textile and clothing case study, an initial list was developed by the workshop participants' based on their understanding of the TLV_{2025}, by focusing on the conditions and developments that could present challenges opportunities to the sector. This initial list was extended through conducting literature review, attending events, and holding supplementary meetings and workshops. This expanded set was then organised into themes and prioritised through discussions with industry representatives and policymakers. Finally, we selected four of the most significant and relevant clusters of opportunities and challenges facing the textile sector, described below:

- **Innovation**: this cluster brings together many diverse points that were raised such as new products, markets, production processes and services, highlighting the need to approach the issue systemically.
- **Resources**: as for all industrial sectors, this is a major topic for textiles. The objective is to reduce the need to import raw materials and shift towards a more "circular" distributed system using less water and energy with a more local production and consumption of more renewable and recyclable materials.
- **Trade**, in particular for access to quality raw materials and to provide opportunities for exporting high added value finished products, emerged as a crucial factor to address to secure a sound future for EU-based textile manufacturing.
- **Skills**: the loss of skills because of an ageing workforce and the difficulty to find enough young professionals qualified in the new textile technologies is perceived as a major obstacle to the future development of EU textiles and clothing manufacturing.

All clusters have some technical and collaborative angle, which were identified as cross-cutting issues during the prioritisation exercise.

4.4 Proposing actions

The final step of the process consists in developing responses, concrete actions that specific actors could take to capitalise on opportunities and overcome the challenges faced in achieving the vision. The conversations were structured along a template so to ensure that on the basis of the challenge, information was gathered so to have responses from different actors from the sector (i.e. individual company, industrial associations and other organisations related to textile, policy makers), as well as in how far setting up specific collaborations would help tackling the challenge. We also looked in how far technological solutions would be an asset to response to the identified issues.

Figure 3: Template used at all Challenge Stations for Proposing Actions (facilitator's copy)

The following sections describe the proposed responses to the challenges and opportunities facing the sector obtained through the four 'Challenge Stations' *Innovation, Resources, Trade and Skills*.

4.4.1 Innovation

The European textiles industry is under a lot of pressure for product innovation. While this is inherently risky and costly, inaction is also risky due to intense competition from low wage countries. Innovation is largely concentrated at company level – many of which are SMEs – so coordination and collaboration are important. Many firms in the textile and clothing sector outsource research and development, so the innovation process is often fragmented. In addition, many firms do not have a dedicated capacity for innovation, so it is characterised by ad-hoc, rather than continuous initiatives. Also, because of the time and cost required to protect intellectual property, textile SMEs tend to be secretive and agile, rather than adopting an open innovation approach. Most often, innovative ideas are not patented, SMEs preferring to protect markets through the speed and quality of delivery and the establishment of systems and reputations in their own niches. Within the theme of innovation, several challenges and opportunities were identified which formed the basis of scenarios presented to the participants at the 'Challenge Stations'. The scenarios presented to participants are reproduced in Annex II, while the specific actions suggestions are described below.

Customisation and consumer co-production

There is an opportunity for the textile sector in emerging business models establishing a more collaborative relationship between customer and supplier. This ranges from supplying individually customised goods to customers becoming co-producers, buying base products which they customise themselves or in collaborative spaces such as sewing cafes, print shops and maker spaces.

Many firms have begun to respond to this opportunity. Adidas, for example allows the customer to personalise a range of design elements for sports shoes. This creates a pressure on the company to deliver the customised product within an acceptably short delay which precludes relying on Chinese or other faraway factories. This requires that at least part of the manufacturing be located close to the customers and could increase the manufacturing added-value in Europe. The participants suggested several ideas for how textile firms could seize opportunities presented by these developments. First, it is important to better understand the users of these emerging markets, likely to be young, internet savvy professionals as well as customers with specific needs, e.g. particularly tall, short, handicapped, etc. The possibilities should be demonstrated to these (and other) customers. In order to meet demand, firms will need to be flexible and responsive, either developing in-house expertise or working through existing e-commerce platforms. Designers should be consulted on how to maximise the potential of mass customisation and customised manufacturing.

A range of techno-infrastructural developments would support the development of these markets for the textile sector. For example, 'scan shops' where customers can have their bodies accurately measured for individual 'perfect fit' clothes would support the market for mass customisation, whereas increasingly small, affordable and user friendly devices for cutting and printing would enable more customers to act as co-creators and to adapt items after purchase. Technology could be borrowed from other sectors, for example medical scanning and body measurement techniques.

This could be supported by policy, e.g. funding infrastructural development and research in scanning, measurement, visualisation and RFID technology. At a European level, participants suggested that harmonisation of VAT, e-commerce regulations, the digital single market and improved (sustainable) transportation would all foster innovation in the area of customisation and co-production.

Trade bodies could stimulate textile firms to take advantage of these opportunities by raising public awareness, addressing the skills gaps, and supporting collaborations between textile firms and technology suppliers, delivery/logistics companies and IT/knowledge management experts.

Smart Textiles and Product Innovation

Smart textiles present many opportunities for textile firms in new areas (e.g. construction, health care as mentioned in the discussions).

Companies should develop technologies and consider sound strategies for dealing with patents, national and EU regulations and financing bodies. They should also get to work with other sectors, and scan widely for opportunities in new application areas. They should seize opportunities to inform and educate workers and customers. Many firms would benefit from developing experience in technical marketing (i.e. communicating the value of products; increasing security; publishing articles in international sector magazines; producing sales videos about technical performance and the standards applied).

Success may be contingent upon effective collaboration (e.g. with other sectors, universities, etc.), appropriate standards and financial backing. Trade bodies and regulators play important roles in these aspects. While the sector expects further development in the field of smart textiles in the coming years, many application areas can be exploited with existing technological capabilities. Nonetheless, new production processes, materials and use of software often require substantial adaptation.

Regulators could support smart textiles through the development of appropriate standards. This applies not only to textile end-products, but also to other sectors that could benefit from smart solutions. Authorities could also play a supportive role through public procurement, research grants and tax relief.

Servicisation

Servicising can be defined as *a transaction where value is provided through a combination of products and services and where satisfaction of customer needs is achieved by selling function of the product rather than product per se and/or by increasing the service component of the offer* (SPREE Project[9]). Some such services are already well established within textiles. For example, instead of purchasing towels and bed sheets, hotels may pay a monthly fee for the towels and bed sheets to be provided. As well as continued responsibility for managing maintenance and depreciation, the provider may offer bundles incorporating other services such as cleaning, ironing, folding, etc. While there is some scepticism about the extent to which this model could be extended more widely, particularly in mainstream clothing, firms could take niche markets as a starting point, building upon established business to consumer rental markets for wedding and fancy dress clothing as well as business to business service markets such as medical wear and personal protection equipment.

Companies considering such a step should take advantage of online as well as offline markets, especially of platforms which are an increasingly important tool for online transactions. Business to business and business to consumers, and even consumer to consumer (peer to peer transactions, as seen in the so called 'sharing economy') platforms should also be considered. Participants identified several areas for collaboration with cleaning and maintenance services, travel, sport, hotels and manufacturers from other industries, as well as actors providing local infrastructures and logistics. The technology required to implement this kind of business models is available - including online platforms, track and trace, garment selection support (size, model, etc.) as well as cleaning, reputation systems, and even GPS/RFID technology to track products and their lifetime. Regulatory actors and industry bodies could support initiatives through the development of texting methods, quality standards, networks and financing.

Digital manufacturing technologies

Digital manufacturing technologies may present opportunities related to customisation and personalisation. Challenges to adoption include technical skills and financing. Firms may be able to start small- either outsourcing capacity or bringing in consultants for a trial period. The necessary technology is available, perhaps even second hand, or with access gained through some collaborative initiative.

Policy actors could support developments in this area through funding of demonstration projects and networks, as well as investing in the infrastructures and ecosystems on which these initiatives rely (transport, delivery, knowledge sharing, etc.).

Collaboration could present opportunities to gain access to technologies, perhaps through a fablab or makerspace type initiative bespoke for clusters of SMEs, especially for access to digital printing technologies.

Textile organisations could support developments in the area of digital manufacturing by highlighting opportunities for SMEs and improving their capacity to develop strategies. Continuing to explore and push the boundaries of the market for smart textiles would also be beneficial, particularly through networking and strategic information exchanges. For example, lessons on quality deterioration could be learnt through exchanges with the dry-cleaning sector.

[9] http://www.spreeproject.com/wp-content/uploads/2012/08/SPREE-Brochure.pdf

SUGGESTIONS FOR POLICY ACTION UNDER INNOVATION

- Support actions to understand better the users of emerging markets for customised products, to involve designers to maximise the potential for mass customisation.
- Support for techno-infrastructural developments (e.g. 'scan shops'), e.g. by funding infrastructural development and research in scanning, measurement, visualisation and RFID technologies.
- European harmonisation of VAT, e-commerce regulations, the digital single market and improved (sustainable) transportation.
- Foster collaboration with other sectors and universities, develop standards, provide research grants and tax relief for smart textiles.
- Support the development of texting methods, quality standards, networks and financing for service based business models.
- Fund manufacturing technologies demonstration projects and networks and invest in the infrastructures and ecosystems on which these initiatives rely (transport, delivery, knowledge sharing, etc.).

Box 3: Suggestions for policy action on innovation for the textiles and clothing sector

4.4.2 Resources

Resources, including raw materials, water and energy are fundamental for all manufacturing industries and a key aspect of the future of manufacturing in the European Union, especially in view of the large dependency that European companies have with respect to imports from third countries. The sectorial vision statement developed in this study states that the textiles and clothing industry "*will operate according to a globalised and efficient circular economic model that maximises the use of local resources, exploits advanced manufacturing techniques and engages in cross-sectorial collaborations and strategic clusters*". In that context, the discussions among the experts highlighted several challenges and opportunities which formed the basis of scenarios presented to the participants at the *Resources* 'Challenge Station'. These are reproduced in Annex II, while the participants' responses are described below.

Integration

As closing material loops loomed large in the discussions, and in view of the specialisation and small scale of most actors in the sector, partnerships and platforms were highlighted as essential to deal with resources. They were seen as providing the multi-level integration required for most textile SMEs to move towards a circular production and consumption model. This cannot be achieved by each actor on its own. It must be complemented by a strong increase in the local sourcing of raw materials. Renewability can be increased by the development and use of bio-materials and recyclability by reducing blending and developing new materials, preferrably renewable, that facilitate recycling. This need for integration of the various actors, both along the value chain and across industry sectors extends to the possible participation of the textiles and clothing sector to the development of industrial symbioses.

From design to new business models

On the manufacturing side, the combined pressures from material cycling and closing the material loop as explained above, cost competition and an increasingly customised demand are increasing the need for flexibility, resource efficiency and water use reduction. However, the full potential from this trend can only be realised if design plays its part. Design must be oriented towards sustainability by increasing the longevity of textiles products, by making materials evolutionary (so as to increase longevity) and by making disassembly of textiles products easier in order to facilitate recycling.

These developments must be complemented by the introduction of new business models to align resource efficiency requirements and 'circularity' with profitability. For example, one of the key resource challenges is reliable access to enough used fibres and recycling. New business models are needed that provide incentives to users to return used textiles to the manufacturers.

Technology needs

As for industry in general, there is a general need for expanding the use of digital technologies, in particular as enablers of more circular practices and business models and as a means to make customisation easier.

Recycling came back as a constant in the discussions on resources. While collection is still a major issue, technologies are sorely needed for textiles sorting and fibre separation. This can be helped by developments in logistics. In particular, being able to track materials throughout the transformation process and the value chain would deliver large benefits for material recovery and resource efficiency. In the domain of resource efficiency, technologies are needed specifically to address the two challenges of dyeing without water and being able to remove dyes easily for recycling. The ability to blend locally sourced fibres for quality fabrics would also facilitate resource efficiency. Additive manufacturing also holds many promises.

In another register, as for many other sectors, reputation management is also an issue.

SUGGESTIONS FOR POLICY ACTION UNDER RESOURCES

- Prevent used textiles and recycled fabric from leaving the EU.
- Facilitate the sourcing of materials.
- Facilitate traceability of materials and encourage demand for recycled content.
- Protect recyclers from the volatility of virgin raw materials prices.
- Support pilot projects for recycling.
- Adjust energy taxation to favour recycling.
- Invest in infrastructure for used textiles collection, sorting and recycling.
- Support the development of technologies for recycling.
- Invest in biotech research to develop local renewable textiles raw materials.
- Act in collaboration with all stakeholders to improve the acceptability of GMOs by the public.
- Develop marks and certification schemes.
- Develop textiles credit scheme on the model of carbon credits.

Box 4: Suggestions for policy action on resources for the textiles and clothing sector

4.4.3 Trade

The EU textiles and clothing sector could not exist without a vibrant trade. Trade is essential both for sourcing raw materials and as a source of international markets, as in 2014 €43b worth of European textile and clothing products were exported, and €99b imported from extra-European markets[10]. The sector is particularly dependent on imports for raw materials (e.g. cotton) and energy. At the same time, trade is the source of strong competition for the sector. Within the theme of *Trade*, several challenges and opportunities were identified which formed the basis of scenarios presented to the participants at the 'Challenge Station'. These include the challenge of producing textile products with a high environmental and social standard while competing with lower cost imports that may have negative social and environmental consequence, the challenge of overcoming non-tariff trade barriers in order to capitalise on the USA market, the challenge of responding to counterfeit goods (in the EU and emerging economies), and the opportunities available through mass customisation for emerging markets. The scenarios presented to the participants are reproduced in Annex II, with the actions proposed described below.

Ethical Products Competing with Low-Cost Imports

The participants were prompted to consider how European manufacturers of ethical products – designed to maximise environmental and social value as well as profit – can compete with lower cost imported products that are not subject to the same rigorous standards.

[10] http://euratex.eu/fileadmin/user_upload/documents/key_data/fact_and_figures_2014.pdf

Suggestions for actions at a firm level included emphasising quality and value, over messages of European identity and sustainable approaches which, while central to the production approach, are unlikely to lead to success in the market. Policy could, and should, support such initiatives by offering financial incentives (e.g. via taxation) for adopting production methods that maximise social and environmental benefits.

Barriers to the US Market

Because the US and Europe apply different product standards – for example the type of flammability requirements – companies face barriers to operation in both territories. Non-tariff barriers such as customs management and clearance procedures compound these issues, making it especially difficult for small European firms to break into the American market.

Of course, firms can design products according to US requirements, but it will be crucial to work with the prominent US distributors to ensure it will be worth the extra development and compliance costs. Collaborative networks could support European firms seeking to enter US markets.

The role of policy, here, is to harmonise standards and testing techniques across the US and EU markets (or agree mutual recognition), while negotiating a smoother flow of goods between the two trading blocs. Textile trade bodies should support the sector by continuing to inform these negotiations, representing the interests of European firms.

Emerging Markets and Counterfeit Goods

Counterfeit goods present a serious challenge for textile and clothing manufacturers, particularly for high end and luxury items. The challenge of enforcing rules against counterfeit goods and competing with these products both within the EU and worldwide is increasingly acute for European manufacturers, and undermines efforts to ensure quality, social and environmental standards.

One approach firms can apply to target consumers that prefer to buy cheaper counterfeit goods is to convince them of the benefits of purchasing original products rather than fakes. Firms can also do a great deal to protect customers that want to buy genuine products from fraud. Current technology allows sophisticated tracking of products' origin and lifecycle, while the registration of products and customers can allow fact checking and opportunities for direct sales where consumer choices may be limited.

In terms of policy action, some participants felt that current rules and regulations are adequate, but that their implementation is inadequate. This includes customs controls and punitive measures for fraudsters. Customs officers could be better equipped with current technology allowing databases of products and means of verifying compliance with standards as well as checking products' authenticity. Along with industry bodies and firms, however, policy action in the area of product standards could make life more difficult for counterfeiters. For example, voluntary standards for smart labelling could help consumers to become accustomed to checking products' origins and lifecycles.

Customisation for Emerging Markets

A new generation of wealthy consumers in emerging markets is leading to increased global demand for high end European textile and clothing products. EU manufacturers face challenges in maximising their impact in these markets, both because of trade and customs protocols and subtle market differences. Regional customisation techniques may help in this regard, allowing firms to target more specific markets.

SUGGESTIONS FOR POLICY ACTION UNDER TRADE

- Offer financial incentives (e.g. tax breaks) to actors adopting production methods that maximise social and environmental benefits emphasising quality and value over European identity and sustainability.
- Harmonise standards and testing techniques across the US and EU markets (or agree mutual recognition), while negotiating a smoother flow of goods between the two trading blocs.
- Ensure adequate implementation of current rules and regulations, e.g. by equipping customs offices with current technology to verify compliance with standards and check products' authenticity.
- Take initiatives in the area of product standards to make life more difficult for counterfeiters, e.g. by promoting voluntary standards for smart labelling to help consumers become accustomed to checking products' origins and lifecycles.
- Reduce tariffs and the burdens of custom management to support firms expanding into emerging markets.

Box 5: Suggestions for policy action on trade for the textiles and clothing sector

Firms can rise to this challenge by deploying technologies already used elsewhere, allowing a closer relationship between producer and consumer and marketing directly to individual customers. Modular production will allow smaller run sizes allowing greater diversity of sizes, colours, patterns and other features that may appeal to specific regional or national markets.

Policy action in the area of trade deals to reduce tariffs and the burdens of custom management would support firms expanding into emerging markets. Trade associations can support firms by researching market trends in emerging economies, and could also set up networks with fulfilment platforms.

4.4.4 Skills

In the course of this project, skills remained at the core of conversations from the first workshop. This issue lies clearly at the core of the concerns of the sector and is linked to two main sets of challenges. One is related to a generational change. The textiles and clothing sector is made of many long established firms holding a large amount of traditional know-how. With the retirement of the baby boom generation, there is a risk of losing a large part of this traditional know-how if they cannot be replaced by younger people. The second is linked to the fast pace of technological change and the related need to acquire new know-how. The mini-scenarios presented to participants are reproduced in Annex II.

Collaboration between university, other teaching institutions and industry

The challenges mentioned above would lead to think that there should be a lot of collaboration between the sector and universities, in particular in terms of setting new curricula to address the needs of the sector. Indeed, this issue was often mentioned in the workshops but current interactions appear to be insufficient.

One argument related to the fact that universities and companies work at different paces. From the point of view of firms, universities do not react quickly enough: they are not oriented towards the same type of results, they often seem disconnected from the real world of the textile industry. Also, some researchers would rather like to keep working in depth on 'their topics' and are not very proactive in terms of switching to research that would be more relevant for today's industry. This is why some companies prefer to work with start-ups. From their side, universities do not like to be asked by companies to do things for free for them, as seems to be happening sometimes. In the current context of public budget restrictions in many countries there is no time and funding for this. Universities also have teaching responsibilities. University lecturers are already stretched with resources. Getting funding for research projects is a long-term process that doesn't generate quick results. Applying for funding is often very time-consuming and, if unsuccessful, the time invested is lost. This is demotivating in the context when universities are allocated funds based on the number of students (UK

example). Direct funding from industry might be an interesting alternative if there is a match in topics of interest.

In the case of universities or other teaching institutions providing training in the field of textiles, one issue that was identified was the technological gap between the technology sometimes present in the teaching institutions, sometimes obsolete, and the technology currently used in the textiles industry. One anecdote mentioned the case of a highly skilled student coming from an institution working with old technology spending time at a company that had invested in up-to-date machines put in the hands of low skilled workers. Another issue was the decreasing number of students selecting studies related to textile, even in regions where the textile industry has vibrant clusters. Have we entered into a vicious circle? The next section, on attracting the next generation of textile workers, provides more elements of reflection.

Sending employees from textiles companies away for extended periods of time to undergo extra training could be very effective. However, as most firms from the textiles and clothing sector are SMEs, they might not be able to spare one person for such a long time, and their employees might not have the required language skills (most often English) if the relevant training is abroad. Policy makers could support translation and adaptation of these courses to make them more broadly accessible.

Education policies, which are usually designed at a national level, but where many regions also have policy competences, could be developed to support more vocational education programmes. This can range from informal links between universities, trade schools and firms, to developing technical work in high schools, and financing apprenticeship programmes. At EU level, funding for research projects could include a requirement for dissemination strategy to education institutions to foster the transfer of knowledge.

Industry-university collaboration is seen as an important part of the response to this challenge, both in the development of wide networks and associations and in specific schemes to link, for example, universities with local companies in order to develop connections and foster understanding between the sector and its future workforce.

Attracting the next generation of textile workers

In response to the need to improve the attractiveness of the textiles sector for prospective employees, especially for young people, the participants developed several suggestions.

First of all, it is important to identify which skills are needed so that recruiting efforts can be focussed in the right long-term direction. Then it is important to understand the needs and motivations of their next generation of workers. Young people are interested in working for the brands they know, they want to have flexible working time and they want to see that their ideas can be taken on-board. They also need to feel that someone listens to them and have a different relationship to hierarchy than older generations: 'bossy' behaviour on the part of superiors or older colleagues might not be the best way to manage them. It is not always easy for small factories, for example, to respond to demands for more flexible working patterns, and there may be a cultural gulf between established professionals working in traditional firms and the younger generation which may, more often, operate on a freelance basis.

Beyond offering attractive salaries, to attract the next generation of textile workers, companies need to ensure they have a good image. While this is identified as a problem for the textile sector as a whole, there are steps that individual firms can take. For example, by making business plans for 2020 public, and communicating with local communities to show that the sector has a future. Candidates could be offered support in identifying potential career paths, linked with the long-term vision of the sector.

The image of the sector, often perceived as old fashioned, is also an issue. Companies need to communicate the sector more effectively as a modern, vibrant and high-tech sector with a broad range of application areas and opportunities much wider than fashion and design. This might be encouraged through open days and competitions for designs and business plans. Adoption of aspects of the Corporate Social Responsibility (CSR) agenda – including commitments to good working conditions, pay and diversity – may appeal to young workers, as well as the possibility to earn shares in firms, fostering a long-term perspective. In the meantime, where workers are not available, companies may develop staff exchange programmes with partner companies for specialist roles, consider in-house trainings, collaborations with vocational programmes, or apprenticeship schemes. Companies could also raise interest of employees by offering international experiences through exchange programmes with companies with whom they collaborate. For example, in relation to new skills, some participants mentioned that it could be interesting for textile manufacturers developing new lines of products to liaise with other sectors (e.g. coatings) that can share information on the use of new technologies and transfer the knowledge.

Textile organisations could also help to respond to this challenge in several ways:

- supporting collaboration, networks, and platforms for developing partnerships (e.g. a profile for the textiles sector on social media),
- lobbying for harmonising textile-related skills at the EU level,
- campaigning towards the next generation of textile workers to help capture new talents,
- help talents move across brands,
- supporting mobile 'FabLabs' (or other 'road shows') to provide young people with hands-on experience of the industry while creating opportunities for networking between various publics, particularly experienced staff and potential future employees.

Actions suggested for policymakers included funding initiatives for knowledge transfer and tax incentives to encourage young people become co-owners of textile firms. Textile intensive regions are often rural. Local governments could support infrastructural developments (e.g. housing, public transport) to make it easier for young people either to move and settle in these areas or to commute more easily from urban centres.

Technology is also seen as an important feature, both in demonstrating the high-tech character of the sector and in using technology to communicate and collaborate more effectively (e.g. social media, online courses, etc.).

Transferring know-how to the new generation

Keeping know-how in the sector when older workers retire is clearly an issue. The participants developed several suggestions for responding to this challenge. Suggestions included implementing a phasing-out period for staff before they retire, ensuring the opportunity for younger workers to learn from their vast experience. Flexible retirement plans were also suggested, whereby hours are gradually reduced, lessening the burden on staff at the end of the career while continuing to benefit from their insights where necessary. Programmes could be set up to continue to engage the community of retired staff, which could be useful for both social and practical reasons. Technology could also be deployed to capture retiring staff's skills and experience, such as video tutorials and walkthroughs of various tasks. This could even be extended to the production of online courses (e.g. Massively Online Open Courses – MOOCs).

While hiring (extra) younger staff to give them the time to benefit from their older colleagues' experience can be managed by relatively large companies, it is risky for a micro-enterprise: extra costs, additional administration requirements, etc. Policy mechanisms to support such endeavours could include fiscal benefits for younger employees.

Knowledge Management

The European textile sector faces challenges in integrating the data and knowledge management skills required in today's fast evolving world. One example is the need to push the frontiers of lifecycle analysis and labelling which are increasingly expected by customers and regulators.

At firm level, companies can consider traditional options of hiring, training and subcontracting, although management commitment and employee involvement are both important at this stage. Since these skills are often not well understood within the sector, firms could consider hiring a consultant to analyse the situation and to train an in-house quality knowledge manager who can connect these skills to the specific company requirements and design and implement appropriate programmes.

While technology to support knowledge and data management is long established, its adoption has proved slow in the textiles sector. The difficulties in adopting standard approaches to data and knowledge management are exacerbated by the length of the supply chains. Collaboration across these chains could help to build understanding and develop appropriate responses. This area could also be a good topic for academic research, which could be encouraged by funding PhD scholarships.

Trade associations can support firms by producing maps of skills gaps, collecting information on training programmes and, perhaps, even organising some trainings or courses for knowledge/data managers to specialise in meeting the needs of the textile sector. Disseminating information about upcoming technologies that may drive skills gaps in knowledge management (and other areas) could also be beneficial.

Regulatory standards on, for example, labelling could encourage faster action across the sector, as well as enforced compliance with international standards. Such initiatives must be coherent, and should be coupled with substantial guidance and support, particularly for SMEs which may have less capacity and experience in knowledge and data management.

Technical skills

There is a need to ensure that the sector has access to the right technical skills. This is particularly salient for firms that are pushing the boundaries of the traditional applications, e.g. towards smart textiles, or applications in medicine, construction and others that are traditionally associated with other sectors.

Such firms may benefit from participation in collaborative projects, e.g. under the Horizon 2020 programme. Contact with specialists from other disciplines and sectors (in universities, technical centres, NGOs hospitals, sport facilities etc.) could be a good starting point, perhaps developing towards staff exchange programmes or traineeships for younger staff. Such initiatives could be supported by umbrella organisations, adopting a networking role and acting as an information hub.

Regional policies could support the development of specialist and strategic networks within regions, building connections between different firms while also working with educational institutions to develop the next generation of workers.

SUGGESTIONS FOR POLICY ACTION UNDER SKILLS

- Support translation and adaptation of technical courses to make them more broadly accessible and support sending employees from textiles companies away for extended periods of time to undergo extra training.
- Support more vocational education programmes for textiles, at national or regional level, as relevant;
- Facilitate links between universities, trade schools and firms.
- Fund initiatives for knowledge transfer and develop tax incentives to encourage young people become co-owners of textile firms.
- As textile intensive regions are often rural, local governments could support infrastructural developments (e.g. housing, public transport) to make it easier for young people either to move and settle in these areas or to commute more easily from urban centres.
- Set up progressive retirement schemes and flexible retirement arrangements to facilitate the transfer of know-how from the old generation to young textile workers.
- Develop standards on, for example, labelling to encourage faster action on data management across the sector.
- Regional support for the development of specialist and strategic networks connecting different firms and educational institutions to develop the next generation of workers.

Box 6: Suggestions for policy action on skills for the textiles and clothing sector

4.4.5 Technology needs

At the end of the second workshop, we decided to implement a final exercise to gather insights on technologies that participants identified as not currently available, but potentially useful to them. The resulting suggestions were often general, referring more to the needs than to the technology itself. They are grouped and presented in Box 7.

TECHNOLOGY NEEDS IDENTIFIED IN THE STUDY

Regarding Resource Efficiency

Water- and oil-free production

Clean chemical products

Bio-polymers

Ways to better recycle materials

Technologies to improve the use of local resources

Regarding manufacturing

3D virtual design and printing (using recyclate and biopolymers)

Smart cartography of known and prospective raw materials

Digitalization to make production cycle more transparent & traceable

Standardised communications protocols between production technologies

Technologies for small scale flexible production e.g. for mass customization

Technologies to enable co-design (e.g. for personalised products)

Database to identify know how for cross-sectorial collaborations

Microelectronics

Digital printing and finishing of textile products

Automated/robotic handling and assembly (sewing)

Automated/robotic separation and disassembly (for reuse and recycling)

Regarding customer service

Software to improve contact with customers and e-commerce

3D measurement for accurate sizing

Box 7: Technology needs identified for the textiles and clothing sector

4.4.6 Other needs

Other needs were also identified, mostly related to desirable applications and training:

- Geotextiles for sustainability
- Promote culture of reuse
- Education and training to promote skills in e-commerce
- Use of IT for training and coaching
- Technical textiles applications for individual consumers

4.4.7 Advanced manufacturing

Advanced manufacturing was identified as a strategic area of interest at EU level to ensure the development of European industry. This project has identified some barriers for the implementation of advanced manufacturing technologies for the textile and clothing sector (see Box 8).

Box 8. Main barriers to advanced manufacturing in the European textiles and clothing sector

- The vast majority of companies in the EU textiles and clothing sector are small SMEs that find it difficult to spare the time and human resources necessary to assess the prospects of buying advanced machinery.
- Assuming the above barrier can be overcome, access to finance is a huge issue.
- Many of these companies do not have the skills to operate and maintain highly advanced machinery.
- Digitalisation and robotisation of textiles manufacturing is hampered by the fact that some operations, especially sewing, have so far resisted automation and others, like printing, can only be performed on specific types of textiles.
- Current technical standards across industrial sectors hinder the uptake of technical textiles. The construction sector is a case in point combining inertia from certifying bodies, reluctance of actors in the sector to adopt new materials and lack of skills to apply technical textiles.
- The sector suffers from a bad image among young talent that hampers its ability to recruit the necessary skills.
-

Box 8: Main barriers to the implementation of advanced manufacturing technologies in the textiles and clothing sector

5 Conclusions for the textiles and clothing sector

Textiles manufacturing has been at the core of European manufacturing from the early days of the industrial revolution. Despite suffering substantial offshoring to countries with lower labour costs over the last few decades, the European textiles sector still represents 2.4% of EU manufacturing employment and 1.4% of EU manufacturing value added. It is mostly made up of SMEs that are at once traditional and modern, developing from its beginnings at the heart of the industrial revolution through the adoption of cutting edge technologies. While many firms show readiness to deploy advanced manufacturing technologies, they often lack the resources to fully benefit from their opportunities in the European market. They are well placed to take advantage of key emerging technologies such as ICT, big data, nanotechnologies and additive manufacturing to create novel products and to revolutionize current production processes, opening a potential for bringing some production back to Europe expected to offer high value-added activities with substantial opportunities for skilled employment.

Vision statement

As shown by the vision statement, the European textiles and clothing manufacturing sector is open to embrace an evolution towards a more sustainable future. In that respect, it is facing largely similar challenges to the rest of the manufacturing industry in the EU.

Box 2. Vision statement for the European textiles and clothing industry

By 2025 the textiles and clothing industry, including fibre-based materials, clothing, home and technical textiles, will be **a strategic EU industry sector** providing innovative and competitive products enabling **personalised, adaptable and attractive solutions**, **integrating services** for very **diverse, informed and demanding consumers and businesses**.

It will operate according to a globalised and efficient **circular economic model** that maximises the use of local resources, exploits **advanced manufacturing techniques and engages in cross-sectorial collaborations and strategic clusters**. It will implement **profitable and inclusive business models** and attract **skilled and talented entrepreneurs and employees**

Challenges and opportunities

Four key issues emerged in the study as facing the sector for the next decade: innovation, resources, trade and skills.

The European textiles and clothing sector is already very innovative, and driven by four main trends:

- The desire to personalise products and to bring in the customer as a co-designer and producer, capitalising upon developments in IT tools and robotics.
- The search for new applications for textiles in non-traditional domains (e.g. engineering, construction, healthcare, etc.).
- The need to adopt new service-oriented business models.
- The rapid evolution of digital technologies.

Resources are perceived as a source of vulnerability for the sector as many are imported from outside the EU, especially oil and cotton, at substantial cost. This is why a lot of emphasis is being put both on resource efficiency (in process and through recycling), the development of renewable, local resources, and smart specialisation. Success in this area would reduce dependency on long and vulnerable supply chains, lead to a significant decrease in environmental impacts and reduce costs. One particular challenge identified here is the need to support smaller firms to coordinate their production chains. New designs and the implementation of service oriented business models were perceived to have a large potential for improvements in energy and resource efficiency.

Trade is a sensitive issue as the EU textiles and clothing sector could not exist without a vibrant trade, both for sourcing raw materials and for international markets for finished products. Two key issues are competition

with low-cost imports and non-tariff barriers to trade, especially with the USA, for finished products. Of particular significance for textiles is also the fight against counterfeit goods.

Finally, the sector is facing a major two-pronged threat on its skills base: preservation of its largely traditional know-how through the current generational change in its work force and acquisition of new skills to be able to take full advantage of the digital technologies. The attractiveness of the sector for young people and collaboration with universities and teaching institutions were recognised as issues requiring particular attention. Knowledge management is also emerging as a new area where the sector needs to invest, largely linked to the development of digital technologies and new business models.

Recommended actions

Industry actions

There is an opportunity for the textile sector to engage in new business models providing more services and establishing a more collaborative relationship between customers and suppliers. For this, it is important to better understand the users in emerging markets. Companies should also develop technologies and consider sound strategies for dealing with patents, national and EU regulations and financing bodies. They should also get to work with other sectors, and scan widely for opportunities in new application areas. Participation in partnerships and platforms were highlighted as essential to deal with resources as they were seen as providing the multi-level integration required for most textile SMEs to move towards a circular production and consumption mode. The industry should also orient design towards sustainability and emphasise quality and value associated with high standards. The sector should also invest in convincing customers of the benefits of purchasing original products rather than fakes. It should also train its workforce, acquire new know how and make efforts to attract young people.

Policy actions

A number of support actions were identified such as for techno-infrastructural developments both to support new business (e.g. 'scan shops') and to close material looks (e.g. for used textiles collection, sorting and recycling). This should be combined with the funding of manufacturing and recycling technologies demonstration projects and the prevention of the export of used textiles and recycled fabric. This should be combined with initiatives to facilitate the traceability of materials and encourage demand for recycled content (e.g. certification schemes). The sector also supports more EU action to improve the functioning of the Single Market (e.g. harmonisation of VAT, etc.).

Measures should be also taken to ensure the adequate implementation of current rules and standards, especially at the borders of the EU. In parallel, efforts should be made to harmonise standards and testing techniques across the US and EU markets. New product standards should also be developed to make life more difficult for counterfeiters.

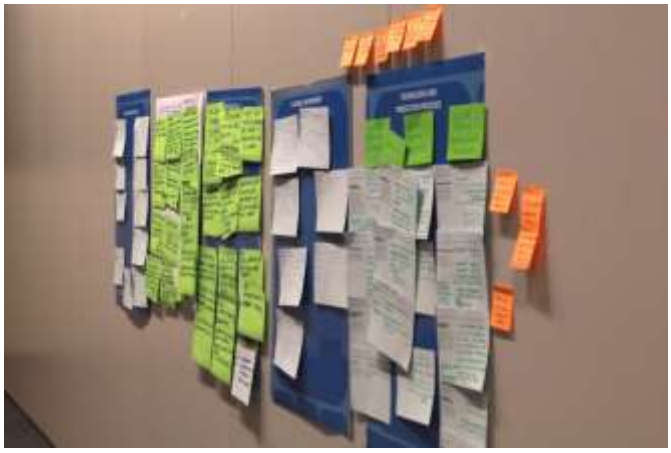
As skills are so crucial to the future of the textiles and clothing sector, it is important to support vocational education programmes for textiles, at national or regional level, as relevant and to facilitate links between universities, trade schools and firms. This should complement the development of progressive retirement schemes and flexible retirement arrangements to facilitate the transfer of know-how from the old generation to young textile workers. In many places, regional support for the development of specialist and strategic networks connecting different firms and educational institutions would be useful to develop the next generation of workers.

Actions for other stakeholders

Actions taken by other stakeholders could facilitate significantly the actions taken by the industry and policy makers to address the different challenges. For example, trade organisations could play an important role in creating non-competitive platforms for technology development, development and promotion of design standards or benchmarking best practices. They can also play a significant role in developing and promoting certification schemes, preparing position papers. Finally, they can also help by raising awareness in society, educating policy makers and promoting compliance with standards and legislation. A wider range of actors can also contribute: consumers acting more responsibly, schools adapting education and all actors in the value chain acting more responsibly and in better coherence.

Technology needs

Regarding resource efficiency, the main technology needs revolved around cleaner processes, improved and renewable materials, materials recycling and improving the use of local resources. Regarding manufacturing, the focus was on technologies for small scale flexible production for mass customization (e.g. 3D virtual design and printing), digital technologies to enable co-design (e.g. for personalised products) and digitization to make production cycle more transparent & traceable. Robotics for handling and assembly (sewing) as well as for separation and disassembly (for reuse and recycling) are also needed.



6 Annexes

6.1 Annex I – Organisations represented at the two workshops

Acabamentos Têxteis de Barcelos	Company
Benetton	Company
Bivolino	Company
Centexbel - Belgian Textile Research Centre	Technical Centre
Centre for Sustainable Design	Research institution
CITEVE - Textile research centre	Technical Centre
Cleviria	Company
Consejo Intertextil Espagnol	Association
DutchaWEARness	Company
ENSISA - University Mulhouse	Research institution
Euratex	Association
European Man-made Fibres Federation CIRFS	Association
Finatex - Finnish Textile industry federation	Association
Sperotto Rimar	Company
German Textile Research Council FKT	Technical Centre
Institute for Natural Fibres and Medicinal Plants	Technical Centre
ITA - RWTH Aachen	Research institution
Katty Fashion	Company
Lenzing AG	Company
Lithuanian Textile Research Centre	Research institution
Ohmatex	Company
Pirintex	Company
Rentokil-Initial	Company
Research Institute of Textile Chemistry and Textile Physics U. of Innsbruck	Research institution
La Cambre	Teaching Institution

T3NEL	Company
European Technology Platform on Textiles	Public-Private Research Partnership
Union des Industries Textiles UIT	Association
Università Commerciale L. Bocconi	Research institution
University College Ghent	Research institution
University of Bergamo	Research institution
University of Cambridge	Research institution
University of Leeds	Research institution
University of Minho	Research institution
UP-Tex Textile Cluster Lille-Roubaix	Technical Centre
UTEXBEL	Technical Centre
Varteks	Company
Wemake	Makerspace

6.2 Annex II - Glossary

Icebreaker

An icebreaker session is usually at the start of a workshop, it's main function being to ease the participants into the process, 'breaking the ice'. This is important because interactive activities demand more from participants than other forms of meeting where an active role is not required. Icebreakers can range from short activities where participants talk to their neighbours to longer sessions where they complete a structured activity, introduce themselves to the whole group, and find out who else is in the room. There are often secondary aims to icebreaking exercises, such as encouraging participants to use their imaginations, to adopt an interactive posture, to think systemically, or to think about the future. These should be carefully designed to ease participants into the schedule of activities.

World Café

World café is a standard format for group work at interactive workshops. Participants are organised into several smaller groups (usually between 4 and 10 participants per group) and work on an activity. After a fixed time, the groups rotate, leaving their activity and joining a new table, where they continue with the work of the previous group. Likewise, a new group joins their own table and continues with that activity. Often, a moderator and/or 'champion' remain at one table throughout the activity, without changing tables.

Champion

A champion is a participant, rather than a member of the organising team, who commits to capturing discussions and developments during a session, often taking responsibility for reporting back to the whole group. The use of champions may help give ownership of the process to the group, and allows insights to be delivered in the voice of participants, rather than organisers. Sometimes, participants are reluctant to act as a champion, either because they prefer not to report back to the bigger group, are not confident of their capabilities, or because they prefer to move around several activities without responsibilities. Those most willing to act as champion are not always the best choices, as they may have a very specific interest that does not reflect the diversity of views within the group, or because they enjoy the platform of reporting back and use the opportunity to talk at great length.

Focus Groups A focus group can be an event in itself, or a format for a group work session within a larger workshop. In both cases, participants work in small groups (ideally between 4 and 10 participants), often accompanied by a moderator to guide the activity, a note-taker to record proceedings and/or a champion.

Plenary

Plenary refers to the whole group at a workshop being engaged in the same activity. Most commonly, this refers to a lecture or Q&A format, where participants act as observers. As the size of a plenary group grow, wide participation becomes increasingly difficult. Nonetheless, it is possible to design and moderate interactive plenary sessions.

Interviews

Interviews are opportunities to discuss with one (or occasionally 2 or 3) participants at length about a particular topic. They complement workshops well, as they offer opportunities for more in-depth discussion, supplementing or clarifying concepts either before or after an event. The organisational burden is much lower because scheduling is much simpler and telephone/video conference services can be effectively deployed.

6.3 Annex III – Mini-Scenarios

Innovation Situation 1: Customisation and consumer co-production

ClothU is a small firm that makes high value customised clothing products. There is a potential for new types of resource-sharing platforms to connect and organise networks of consumers, designers and small scale textile printing and garment making facilities (e.g. print shops, sewing cafés, home sewing etc.) allowing consumers to buy fully customised garments at lower costs and faster delivery. There is a lot of new investment into these types of capacities by leading online retailers and venture capital firms and great media attention. You are considering possible options to respond to this challenge, such as complimenting your products with other tangible elements or new services; doing other things with your skills/ equipment such as renting it out; etc.

Q: How should ClothU respond to this challenge to remain competitive?

Innovation Situation 2: Smart textiles and product innovation

A strong earthquake has recently hit in the Eastern Mediterranean leading to significant destruction of houses and infrastructure and unfortunately also to loss of lives in the bordering area of Greece, Bulgaria and Turkey. A massive EU supported aid and reconstruction package has been launched which stresses the need to rebuild in a more earthquake-proof way encouraging the use of new technologies and construction concepts. Your company SmarTex has developed in a past EU research project a smart textile-based, sensor-integrated wall and floor-covering system which has shown to significantly increase earthquake stability of buildings and also enables structural health monitoring of ageing or damaged buildings.

From previous unsuccessful participation in public works tenders in earthquake-prone regions you learned that your considerably more expensive system is unlikely to be selected in purchase cost focussed tenders. In addition you know that most traditional building contractors are unfamiliar with the advantages of your system, and that in case your product is selected in several large tenders you would need to find ways to increase production significantly in a short time.

Q: How do you approach this potentially large business opportunity? What would be the main challenges and how to overcome them?

Innovation Situation 3: Servicisation

Weather&You is a company specialised in hiking clothing and cold/wet weather wear. Most of its products are made in Europe, using high quality materials. Recently, increasing competition from lower quality, more affordable products from developing countries has been threatening Weather&You sales figures. To respond to this trend Weather&You conducted some market research which helped them identify a new niche market: renting clothes to the ordinary traveller. Leveraging the fact that consumer purchases are increasingly facilitated by a range of digital platforms, Weather&You plans to offer customers the possibility to pre-select clothes needed for the conditions and fit-for-purpose on-line and then get them delivered at their destination. Regarding delivery, Weather&You is considering partnering with a car-rental company as well as with a hotel chain. If successful, Weather&You plans also to implement pick-up points at airports having in mind travellers of low-cost airlines, where fees for checked luggage are charged.

Q: What is needed to make this possible? What would be the main challenges and how to overcome them?

Innovation Situation 4: Digital manufacturing technologies

LuxHome is a small company producing premium-quality bed linens, curtains and other interior textiles made with traditional textile machinery (i.e. Jacquard weaving looms, rotary printing, embroidery etc). The company is family run and has been operating for around 40 years with a team of 5 designers/product developers and 50 production workers who help design and produce the products. The company has been selling its products to luxury and design hotels mainly in its home market Italy but increasingly to other customers around Europe and the world. Recently there has been an increasing demand for customised products with rapid seasonal design changes and you are faced with the need to integrate hotel logos, colours and other design elements

into the product quicker. You also see huge potential in developing products that are customised to specialised markets, such as elderly consumers- a market that is anticipated to grow in the coming decades (particularly given the advancements in the area of technical textiles applied to ageing healthcare issues).

LuxHome's traditional textile machinery makes this small run rapidly changing productions highly inefficient and cumbersome. New digital manufacturing technologies such as digital printing or even additive manufacturing could be the solution, but the company lacks knowledge and operator experience with such machinery. Some new competitors start to offer such digitally customised home textiles and while the quality is not yet matching LuxHome's traditional fabrics it is improving rapidly. Therefore LuxHome has decided to modernise production processes and launch itself in the new era of digital textile manufacturing.

Q: What is needed to make this possible? What would be the main challenges and how to overcome them?

Resources Situation 1: Building a business with a circular model

The vision statement says that the textiles and clothing industry "will operate according to a globalised and efficient circular economic model that maximises the use of local resources, and develop advanced manufacturing techniques..."

After having been a savvy operator in the clothing fashion business for 20 years and having achieved financial success, Bart is getting tired of the fashion rat race. One of his acquaintances has made him aware of the dark side of the glamour world, with its child labour, sweat shops, energy and resources wastage and unsustainable practices. His entrepreneurial spirit still intact, he decides to set up a new company that could help him satisfy his newly found environmental conscience: The Clothes Circle. The objective is simple: being able, in 10 years, to be an established provider of affordable good quality clothes on a fully circular model using 100% renewable raw materials.

Q: Considering that Bart is starting on the basis of today's circumstances, how can he do it? What is needed to make this possible?

Resources Situation 2: Responding to climate change

The vision statement says that the textiles and clothing industry "will operate according to a globalised and efficient circular economic model that maximises the use of local resources, and develop advanced manufacturing techniques..."

After having been a savvy operator in the clothing fashion business for 20 years and having achieved financial success, Bart is getting tired of the fashion rat race. One of his acquaintances has made him aware of the dark side of the glamour world, with its child labour, sweat shops, energy and resources wastage and unsustainable practices. His entrepreneurial spirit still intact, he decides to set up a new company that could help him satisfy his newly found environmental conscience: The Clothes Circle. The objective is simple: being able, in 10 years, to be an established provider of affordable good quality clothes on a fully circular model using 100% renewable raw materials.

Summer 2025 - Climate change and increasing food demand from a growing world population have created a double challenge for cotton production around the world. Changing weather patterns have rendered large regions unsuitable for cotton production and increasing food demand is pushing agriculture, especially in India and China, to mobilise more acreage for food production. Diminishing cotton production is leading to higher cotton prices. In Europe, a succession of extreme weather events altering usual patterns is also straining water resources in some regions. In response, authorities have embarked on initiatives to reduce water use, largely by increasing water prices.

Q: What response is The Clothes Circle likely to develop?

Resources Situation 3: Responding to higher resource costs

The vision statement says that the textiles and clothing industry "will operate according to a globalised and efficient circular economic model that maximises the use of local resources, and develop advanced manufacturing techniques..."

After having been a savvy operator in the clothing fashion business for 20 years and having achieved financial success, Bart is getting tired of the fashion rat race. One of his acquaintances has made him aware of the dark side of the glamour world, with its child labour, sweat shops, energy and resources wastage and unsustainable practices. His entrepreneurial spirit still intact, he decides to set up a new company that could help him satisfy his newly found environmental conscience: The Clothes Circle. The objective is simple: being able, in 10 years, to be an established provider of affordable good quality clothes on a fully circular model using 100% renewable raw materials.

The very low prices witnessed in 2014-2015 have reduced significantly investments in oil and gas production as well as in renewable energy. By 2016, many producers tied to resources that were expensive to exploit went out of business. In the US, production from fracking is declining faster than expected. As growth in the developed economies started to pick up by the end of 2016, fossil fuel prices increased sharply, resulting in a sudden increase in prices for non-renewable energy and for oil-based raw materials. Agricultural prices also increased because of higher fuel and fertiliser prices.

Q: How is this impacting The Clothes Circle?

Skills Situation 1: Attracting new workers with relevant skills

SportTex is a small company located in the north of England, producing textile products for use in specialist clothing and equipment for outdoor sports, such as tents, rucksacks and waterproof trousers. The company is family run, and has been operating for around 40 years with a small team of 12 workers who design and produce the products.

In 2020, the company would like to expand in order to take on larger contracts, but to do so they will need to take on more staff and they have found it difficult to find and attract workers with the right skills to the company. There used to be a technical university in the region but the textile-relevant study programmes have recently been discontinued. This is partly due to the fact that young people do not see the industry as attractive.

Q: What could be done?

Skills Situation 2: Ageing workforce and loss of know-how

SportTex is a small company located in the north of England, producing textile products for use in specialist clothing and equipment for outdoor sports, such as tents, rucksacks and waterproof trousers. The company is family run, and has been operating for around 40 years with a small team of 12 workers who design and produce the products.

In 2016, some members of staff will retire. Management realises that by 2020 more workers will follow and they will need to secure a new generation of workers who can maintain the high-quality and efficient production that their customers expect. At the same time, the company is concerned about losing the skills and experience of the older workers.

Q: What could be done?

Skills Situation 3: New demands for data and knowledge management skills

SportTex is a small company located in the north of England, producing textile products for use in specialist clothing and equipment for outdoor sports, such as tents, rucksacks and waterproof trousers. The company is family run, and has been operating for around 40 years with a small team of 12 workers who design and produce the products.

One of the main companies that SportTex supplies asked for more detailed information on the supply chain, as well as the energy and water that is used for each individual product to appear on each product label. However, none of the current staff are sufficiently trained in data and knowledge management to introduce this capability effectively.

Q: What could be done?

Skills Situation 4: New demands for technical skills

SportTex is a small company located in the north of England, producing textile products for use in specialist clothing and equipment for outdoor sports, such as tents, rucksacks and waterproof trousers. The company is family run, and has been operating for around 40 years with a small team of 12 workers who design and produce the products.

There is a new generation of smart tents with enhanced functionality being developed close to market. SportTex sees the potential of this product and believes they are well positioned to respond to this demand. However, special technical skills would be required for this, which are not currently represented in the team. As far as SportTex is aware none of the textile companies in the region have in-house staff with the required cross-disciplinary skills to develop the product.

Q: What could be done?

Trade Situation 1: Ethical products competing with low-cost imports

EthicalJeans is an EU-based producer of denim clothing for consumers that prefer to buy locally produced goods with assured social and environmental performance. They use high-tech recycling processes which allow them to use waste denim as an input to their production process. While they do use some virgin resources, they are all produced within the EU and comply with high environmental standards. EthicalJeans minimise their transit distances by basing their production in Eastern Europe, close to their markets. They offset some of their energy use by producing some renewable energy on-site. They train local people to work in their factories, offering a living wage and health and wellbeing schemes. As EU employers, the safety standard of their factory is very high.

EthicalJeans' products are more expensive than others which have lower social and environmental standards, so they compete at the higher end of the market, with customers that can afford to products with a positive social impact and minimum environmental impact.

The EU is establishing trade regimes and agreements which remove import tariffs for textile products from developing countries. In these countries, environmental and labour standards are often much lower, but the agreement makes their products more competitive in Europe, and squeezes EthicalJeans' margins.

Q: How can EthicalJeans convince customers to pay a premium for products with higher standards?

Q: How can they minimise the costs of meeting their own high standards?

Q: How can the EU support trade, without disadvantaging companies that apply high standards?

Trade Situation 2: Barriers to the US market

SensorTex is an EU based firm that make technical home-textiles, with novel product lines for curtains, carpets, bedding with embedded sensors. There is strong interest in these products from the USA, and good opportunities for access through major distributors. However, different product standards apply to products in the US, including labelling requirements and tests for flammability. These standards are not necessarily higher, but have different specific requirements which would make it difficult for SensorTex to produce in bulk, inflating their costs. The customs management and clearance procedures also take time and money, and Sensortex feel that the expansion of their home textiles business in the USA will not be worthwhile.

However, they have seen excellent results in a new range of products with sensor-embedded textiles that make life easier and more comfortable for older people. They anticipate a large market for these products, and have generated a great deal of interest for orders, particularly in the USA.

While the non-tariff barriers to the US market are discouraging, SensorTex see that their best opportunities for growth are in transatlantic trade.

Q: How can SensorTex minimise the costs of compliance with different standards customs procedures so that they can grow their business?

Trade Situation 3: Emerging markets and counterfeit goods

Beutex is a firm that make luxury textile products including clothing as well as towels and bedding. Most of their products are made in Europe, using high quality materials which are sourced from around the world. Their products are very expensive, with substantial margins, and their small batches of products were traditionally sold to wealthy customers at kiosks in high-end department stores in Europe and the USA, with limited edition items offered directly through their website.

Recently, Beutex have found that many wealthy customers in Asia and Africa are ordering products via their website, and they conducted some market research to help them respond to this trend.

The research found that their products are very much on-trend amongst young, wealthy consumers from developing countries. However, these markets are flooded with counterfeit products bearing their name. These products are also entering the EU market, threatening their sales figures and also their reputation for quality.

Q: How can Beutex capitalise on the emerging market, while competing with low-cost counterfeits?

Q: How can Beutex protect itself from low-cost counterfeits in Europe?

Trade Situation 4: Customisation for emerging markets

Beutex is a firm that make luxury textile products including clothing as well as towels and bedding. Most of their products are made by hand in Europe, using high quality materials which are sourced from around the world. Their products are very expensive, with substantial margins, and their small batches of products were traditionally sold to wealthy customers at kiosks in high-end department stalls in Europe and the USA, with limited edition items offered directly through their website.

Recently, Beutex have found that wealthy customers in Asia and Africa are ordering products via the website, and they conducted some market research to help them respond to this trend.

The research found that their products are very much on-trend amongst young, wealthy consumers from developing countries. There are some Beutex kiosks at some international airports and department stores, but access to this new generation of consumers is mostly limited to the website. They also found that these new consumers have different preferences for the finish and colour sets used in their products. If Beutex can target these different regions by sending batches of products with slight design modifications, they would increase sales significantly.

Q: How can Beutex meet demand for their products in emerging economies?

Q: How can Beutex customise batches of products for specialist regional preferences?

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