ecomoda

MODULE 4 – A NEW APPROACH TO THE PERCEPTION OF TEXTILE QUALITY AND ITS EVALUATION VIA TESTING

ECOMODA Training Course - Introduction

Enoros Consulting

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Literature review

The fashion industry represents a business with an annual estimated turnover of €147 billions (EURATEX, 2022) employing over 1.5 million people (European Environment Agency, 2019) in the EU-27 region. At the same time, the global fashion industry uses more than 98 million tons of non-renewable resources annually, including oil to produce synthetic fibers, fertilizers for cotton plantations, and chemicals for producing, dyeing, and finishing fibers and fabrics. To these, 93 billion cubic meters of water are added, which contribute to worsening the events of drought, the emission of about 1.2 billion tons of CO_2, and 500 thousand tons of microplastic fibers poured into the oceans. Until the seventies, in a context where environmental concerns began to take on importance, fashion firms limited themselves to interpreting sustainability in a communicative key, mainly through green marketing initiatives. It was not until the 1990s when sensitivity towards environmental and social problems began to take on a new value; not only communicative, but above all, anchored to the actual productive and organisational capacity of companies. (Grant, 2009).

Nowadays, attention to sustainability, respect and protection of the environment, enhancement of human resources, safety of working conditions and protection of health, have become fundamental drivers for the development of the fashion industry, impacting the entire value chain, from the commercial proposal, to the relationship with the final consumer, up to the management of the end-of-life of a product. (Raworth, 2017). In a broader sense and in a strategic key, the concept of sustainability has evolved to embrace the search for well-being, a better quality of life and a sense of responsibility towards the community. (Ki, 2016).

In 2009, the **Copenhagen Fashion Summit (CFS)** launched the first sustainability program for fashion companies and the publication of an, at the time, pioneering sustainability report guide (CEO's Fashion Agenda), produced in collaboration with some of the world's top fashion brands and addressed towards fashion company CEOs . The CEO's Fashion Agenda identified Seven Priority Actions for achieving   higher sustainability standards within the industry: **1**. **supply chain traceability**, **2. saving water and energy, 3. workers' security and respect, 4. sustainable material mix**, **5. circular fashion system, 6. better wage systems, 7. digital revolution.**

Its goal was to shift fashion leaders' priorities towards creating more durable products, favouring disassembly of fibers and realizing recyclable garments. On the other side, retailers were incentivized to increase the presence of collections of used garments, while leading fashion companies were encouraged to collaborate with governments to develop better circular systems, and develop innovative technologies to transform textile waste into high-quality fibers. (Cuc, 2011).

In 2018, under the auspices of UN Climate Change, fashion stakeholders worked to identify ways in which the broader textile, clothing and fashion industry can move towards a holistic commitment to climate action, resulting in the **Fashion Industry Charter for Climate Action** and the vision to achieve net-zero emissions by 2050. The Fashion Industry Charter was launched at COP24 in Katowice, Poland, in December 2018, and was renewed at COP26, in Glasgow, UK, in November 2021. The industry charter specifies the following overarching areas of work to be further developed by specific Working Groups: **Decarbonization pathway and GHG emission reductions, Raw material, Manufacturing/Energy, Logistics, Policy engagement, leveraging existing tools and initiatives, promoting broader climate action, Brand/Retailer Owned or Operated Emissions.** (Patrizia Gazzola, 2020).

In April 2020, McKinsey & Company conducted the `Consumer Sentiment on Sustainability in Fashion' interviewing2000 British and German consumers. Two-thirds of the interviewees affirmed the following issues: use of sustainable materials is an important driver for the final purchase (67%)

and brands should be totally transparent about sustainability (70%). The research also shows that Generation Z and millennials have a strong propensity to purchase second-hand items.

The new affluent generations are more socially and environmentally conscious, and so have higher expectations of fashion brands to be more sustainable and ethical in their production processes. This implies an important lesson for fashion brands that want to attract and retain this market segment: brands need to evolve towards new business models based on ethical, sustainable, and circular fashion. This change has also led large fashion companies to start following a greener path. Companies have understood how a sustainable model can produce a competitive advantage in reputation and differentiation.

During the pandemic period, this trend has greatly accelerated. The Kering Group, for example, to which Gucci, Bottega Veneta, Balenciaga and Yves Saint Laurent belong, was selected during the World Economic Forum as seventh out of over 8000 companies for its commitment to green production. "**Sustainability is the organizing principle on which to build the future of the fashion industry, more resilient than ever,**" declared Eva Kruse, CEO of Global Fashion Agenda. The pandemic period has caused severe socio-economic damage, but it is accompanied by environmental deterioration that can also affect economic opportunities and social equity. In the face of this double risk, future generations are ready to be resilient and make their contribution not only on the consumption side but also through their inclusion in fashion companies by bringing green and circular principles with them. (Idiano D'Adamo, 2021).

ECOMODA overall objectives

ECOMODA training course's goal is the creation of sustainable communities and flourishing ecosystems. It promotes environmental and social responsibility, aiming to help young fashion designers to adopt new ways of sustainable fashion.

"Sustainable fashion is defined as clothing, shoes, and other accessories that are manufactured and used in the most sustainable manner possible, taking into account both environmental and socio-economic factors." (https://greenstrategy.se/, n.d.)

The course provides a theoretical framework for practitioners, but policymakers and educators may also find it useful in developing and promoting the acquisition of novel teaching/learning approaches.

More specifically, the ECOMODA Training Course will assist young talented people in the fashion industry in acquiring the ideal blend of creative and strategic thinking that the industry seeks, preparing them, as well as their professors, for a successful career in the fashion sector.
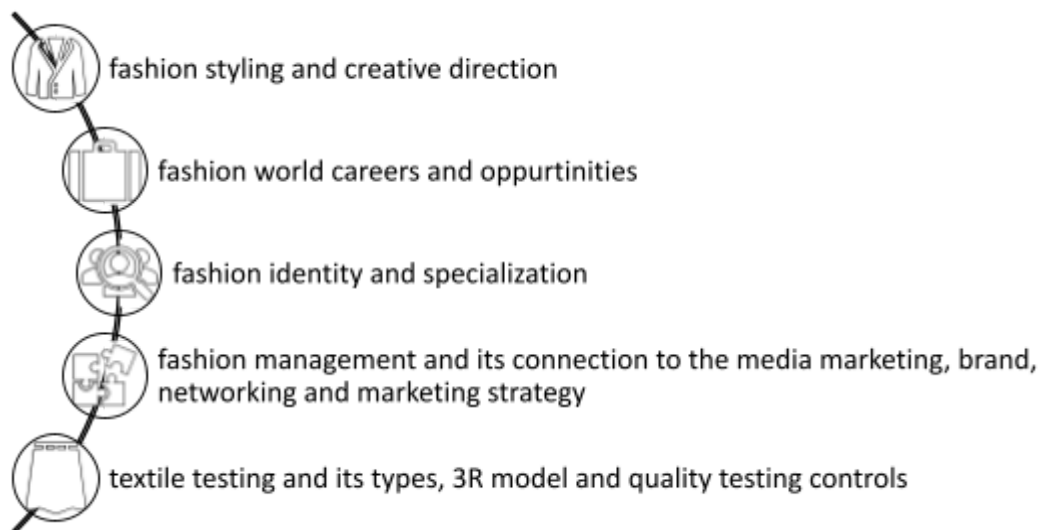
It identifies:

1. environmentally friendly textile and fashion materials
2. training and educational possibilities and pathways for each partner country
3. EU work experience opportunities and employment career growth in the fashion industry
4. best practices in textile and fashion industry businesses
5. ethical fashion

ECOMODA Training Course covers various areas, including legislation and practices, important information on sociocultural shifts and new frameworks for fashion trends. More specifically, the modules will cover topics such as:

- The history of the "Sustainable" fashion world
- The world of fashion and its careers
- Necessary skills for succeeding in the fashion industry
- How to start a career in fashion
- Sustainable development, technologies and products
- Linear vs. Circular economy and textiles
- Fashion Management
- How to promote and sell your brand

Learning outcomes

With the completion of the ECOMODA training course modules, young fashion designers would have acquired the basic **knowledge** of:

fashion styling and creative direction

fashion world careers and oppurtinities

fashion identity and specialization

fashion management and its connection to the media marketing, brand, networking and marketing strategy

textile testing and its types, 3R model and quality testing controls

And the **skills** to:

communicate fashion through digital and physical channels and explore how social media can be used effectively to grow your fashion business

build brands, connect them with their audiences and recognize the proper strategies of marketing in the fashion world

analyse how communication, presentation, problem-solving and project-management skills can help fashion designers

understand how a fashion internship, or an online presence can help someone start a career on the fashion world

exlpore how creativity, self-confidence, discipline and determination, can help someone leave a mark in the fashion world

recognise fashion communication and promotion as ways to go one step further in the fashion world

better understand the everyday operations, the concept of fashion management and every step of the fashion supply chain

Brief description of ECOMODA modules

Module 1 – Leave your mark in the Fashion World
Units
UNIT 1 - The world of fashion 1.1 The history of the fashion world, in particular of the "Sustainable" fashion world 1.2 The world of fashion and its careers 1.3 How to start a career in the fashion world UNIT 2 – The Fashion world 'Must-Haves' 2.1 What skills are required in today's fashion world (and why?) 2.2 Essential theoretical and soft skills 2.3 Best Practices UNIT 3 – Communicate effectively in the contemporary fashion world 3.1 How to leave your impact on the fashion world 3.2 Effective communication 3.3 Secrets and tricks of the trade
Self-Assessment Quiz
Six multiple choice questions to assess the comprehension of the main topics of Module 1.

Module 2 – The road to green and digital transition
Units
UNIT 1 - The fashion industry and its environmental impact UNIT 2 - Fashion and the COVID19 pandemic UNIT 3 - The Quest for Innovation 3.1. Fashtech 3.2. New business models 3.3 New services: Automation and Artificial Intelligence 3.4. New production models: Just in time and on-demand production 3.5. Traceability and blockchain
Self-Assessment Quiz
Four multiple choice questions to assess the comprehension of the main topics of Module 2.

Module 3 – Fashion Management and Media Marketing
Units
UNIT 1 - What is fashion management? UNIT 2 - The fashion supply chain UNIT 3 - How to promote and sell your brand
Self-Assessment Quiz
Six multiple choice questions to assess the comprehension of the main topics of Module 3.

Module 4 – A new approach to quality perception of textile and its evaluation via testing
Units
UNIT 1 - What is the circular economy and why has it been introduced in the textile industry? UNIT 2 - What is textile waste and - what types of textile recycling are there? UNIT 3 - Textile labeling and the responsibility of producers and consumers to minimise the environmental impact of textile products. UNIT 4 - Definition of textile product quality and its testing.
Self-Assessment Quiz
Five multiple choice questions to assess the comprehension of the main topics of Module 4.

Every module of the ECOMODA training course has the **following structure:**

Title of the module - Name of the partner

Summary - Brief description of the topics and key terms

Main goal of the module

Learning Objectives (Knowledge, skills, attitudes)

Main keywords of each module

Units of the module

Activities

Self-Assessment Quiz

Sources

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ECOMODA Training Course

Module 4 – A new approach to the perception of textile quality and its evaluation via testing

CLUTEX

clutex
klastr technické textilie

ENOROSCONSULTING ltd.

Ce.F.A.S.
Centro di Formazione per
Alta Specializzazione

ATEVAL

leSCOP
SOCIÉTÉS COOPÉRATIVES

Title of the module	Module 4: A new approach to quality perception of textile and its evaluation via testing
Responsible Partner	CLUTEX

Content

UNIT 1 What is the circular economy and why has it been introduced in the textile industry?
UNIT 2 What is textile waste and - what types of textile recycling are there?
UNIT 3 Textile labelling and the responsibility of producers and consumers to minimise the environmental impact of textile products.
UNIT 4 Definition of textile product quality and its testing.

Summary

A new approach to quality perception of textile and its evaluation via testing. The Module offers a brief introduction to the concept of sustainable development in the textile and clothing industry; including the types of textile waste, textile recycling methods and circularity in the textile value chain. The Module also focuses on the relationship between eco-design and textile standards.

Aim(s)

- Brief introduction to sustainable development, technologies and products.
- General data on textile consumption and textile waste.
- Circular economy in textile action plan.
- Introduction to the types of textile waste and its possible reuse.
- Introduction to the basic procedures for textile waste recycling.
- Showcasing sustainable technologies through general and practical examples.
- Textile standards:
  - What are textile standards and why is it good to use them?
  - How to find your way around the system of textile standards?
  - Who sets textile standards and what is their use?
  - Why and when is it necessary to follow textile standards?
  - What is textile standards certification and textile labelling?
- Ecodesign and life cycle of products
- How to define the minimum criteria for a different types of textile products
- How and where the quality of textile and textile products can be tested?

Learning Objectives

Module 4: New methods for testing textile materials		
Knowledge	**Skills**	**Attitudes**
● Basic knowledge of the purpose of textile testing ● Basic knowledge of the types of textile testing ● Practical knowledge of the 3R model (Reduce, Reuse, Recycle) ● Factual knowledge of different new types of textile testing methods ● Theoretical knowledge of quality testing control	● Discuss about the importance of textile testing ● Explore the ways of textile testing ● Recognize the importance of reduce, reuse and recycle ● Identify new trends on textile testing today ● Analyse how quality testing control can be used in fashion management	● Awareness of how to promote and inform about the textile testing ● Willingness to learn more about the impact of the textile testing ● Appreciation of all the benefits by using the 3R model(Reduce, Reuse, Recycle) ● Willingness to try new different types of textile testing method ● Willingness to spend time to learn about quality control testing and how it is helps to reduce the negative impact on the environment

Key Terms

sustainable development; textile quality testing; quality standards; circular economy; sustainability; textile waste; circular textiles; 3R approach; reuse, EU strategy

What is the circular economy and why has it been introduced in the textile industry?

Sustainable development, technologies and products

The goal of sustainable development is to ensure economic and social needs while preserving the environment for future generations in a minimally modified form. Innovation of existing technologies, the search for new production methods or the **reduction of the consumption of valuable natural raw materials is a way to reduce the impact of the textile industry on the consumption of natural resources and the quality of the social and ecological ecosystem** (Green deal - European Commission. 2022).

The emphasis is now on more durable, repairable, reusable and recyclable textile products, not only in clothing but also in technical practice. The aim is to reduce fast fashion, the volume of textile waste and the disposal of unsold textile goods. At the same time, it is necessary to ensure that textile products are produced without violating social rights and in an environmentally friendly way.

In March 2022, the European Commission published "EU Strategy for Sustainable and Circular Textiles", aiming to create a coherent framework and vision for the transformation of the textile industry. Its main goals are outlined below:

"By 2030 textile products placed on the EU market are long-lived and recyclable, to a great extent made of recycled fibres, free of hazardous substances and produced in respect of social rights and the environment. Consumers benefit longer from high quality affordable textiles, fast fashion is out of fashion, and economically profitable re-use and repair services are widely available. In a competitive, resilient and innovative textiles sector, producers take responsibility for their products along the value chain, including when they become waste. The circular textiles ecosystem is thriving, driven by

3

sufficient capacities for innovative fibre-to-fibre recycling, while the incineration and landfilling of textiles is reduced to the minimum."

'EU Textiles Strategy', by the European Commission

(https://www.youtube.com/watch?v=yieU6XOkl6U)

One of the main principles of sustainable development is the transition from a linear textile value chain to a circular economy.

Linear vs. Circular economy and textiles

The linear economy follows the steps: "take, produce, dispose". This means that raw materials are collected, made into products and then used, at the end of their useful lives they are discarded as waste. This system is built on the principle of producing and selling as much as possible (maximizing profit).

The circular economy is built on the 3R system: Reduce, Reuse, Recycle

Reduce: use of natural resources and waste production are minimised.

Reuse: finding new uses for things that otherwise would have been disposed of.

Recycle: using waste itself as a resource.

The 3R system enables businesses to remain profitable by using less natural resources, thus, reducing their cost of production, and building stronger relationships with their customers (sustainable profitability).

Consumption of textiles and textile waste

According to the 'Textiles and the environment: the role of design in Europe's circular economy' Report (European Environment Agency, 2022), consumption of textile products is the fourth major contributor to climate change, in Europe; with the textile industry being the third largest sector in terms of water consumption, including land use, and the fifth in terms of consumption of primary raw materials (Green deal - European Commission. 2022).
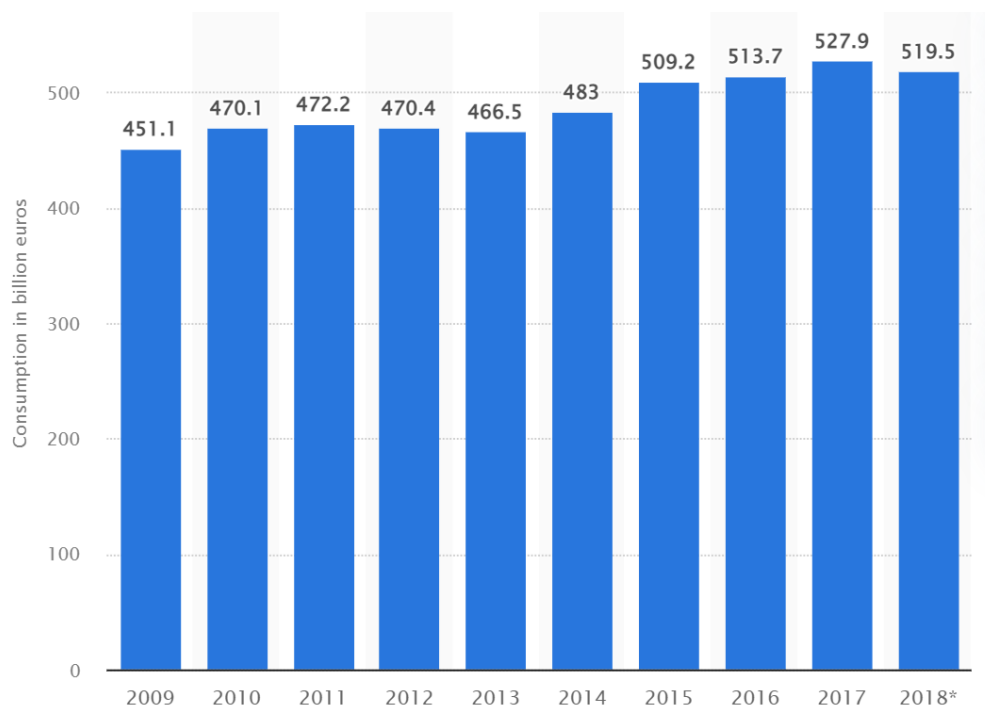

Household consumption of textiles and clothing in the European Union (EU28) from 2009 to 2018

The 2022 EU Strategy for Sustainable and Circular Textiles outlines concrete steps for making textile products on the EU market more durable and recyclable, produced as much as possible from recycled fibres, free of hazardous substances and manufactured with a suitable working environment and environmentally friendly, from 2030 onwards (Textile strategy 30. 5. 2022; Road map). However, this is a great challenge for all actors (i.e., manufacturers, distributors, retailers and customers).

Co-funded by
the European Union

Research findings show that across the clothing industry, only 13% of the total material input is in some way recycled after clothing use, while less than 1% is recycled into new clothing. Most of it cascades to other industries and is used in lower-value applications (e.g., insulation material, wiping cloths, mattress stuffing, etc.) where the material is often very difficult to recapture and recycle, and, therefore, marks the end of the material's life cycle.

Product responsibility lies with the manufacturing companies even if/when the product becomes waste. Therefore, sufficient capacity to recover raw materials from finished textile products will enable the textile market to keep landfilling and incineration of textile waste to a minimum.

Eco-design employs a circular economy methodology for designing products and services which takes into consideration the entire lifecycle of a product/service. Eco-design is a responsible design solution that allows businesses to minimise their environmental impact, while at the same time ensuring that their products/services remain desirable for people, and thus keeping their businesses profitable.
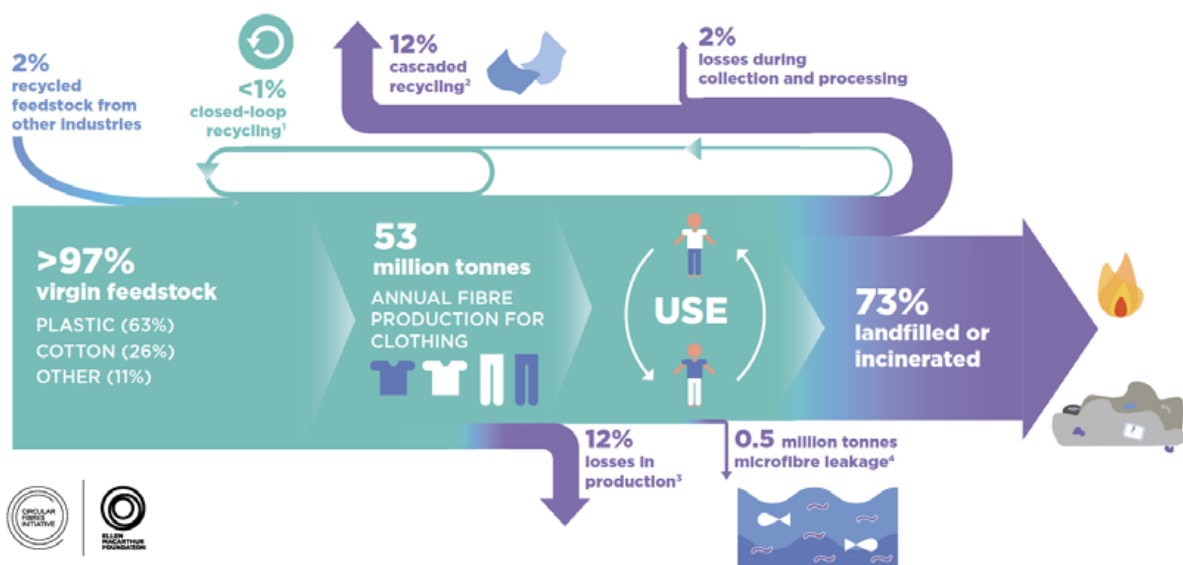

1   Recycling of clothing into the same or similar quality applications
2   Recycling of clothing into other, lower-value applications such as insulation material, wiping cloths, or mattress stuffing
3   Includes factory offcuts and overstock liquidation
4   Plastic microfibres shed through the washing of all textiles released into the ocean

2. What is textile waste and what types of textile recycling are there?

Types of textile waste and the possibility of their reuse

Textile waste is coming from the production of textile goods (i.e., production waste) and from the consumption of textiles (i.e., clothing, home and household textiles) also known as consumer waste or post-consumer waste (EUR-Lex - 32011R1007; Data on the EU Textile Ecosystem and its Competitiveness Request for Services 896/PP/2020/FC).
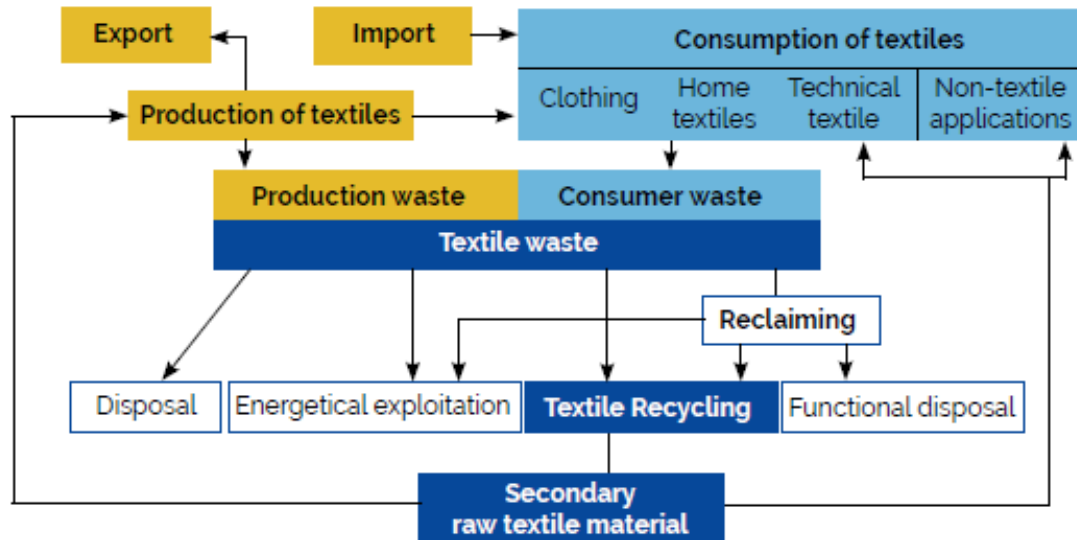

Source: STFI (ENTeR project)

Production waste can be found in all types and stages of textile processing. For example, in the form of good fibres, which are excluded during their processing into yarns at the spinning mill; remains of raw material or longitudinal textiles from manufacturing of monofilaments, multifilament or synthetic staple fibres; remains of yarns; remains of warps or woven fabrics scraps or ends from weaving or remains from knitting; and waste from production of nonwoven textile.

Textile production waste material: fibre waste (also including dust and fluff), yarn residues, textile fabrics, pieces of textile fabrics (selvedges), cutting waste, defective products, fibres (STFI - ENTeR project)
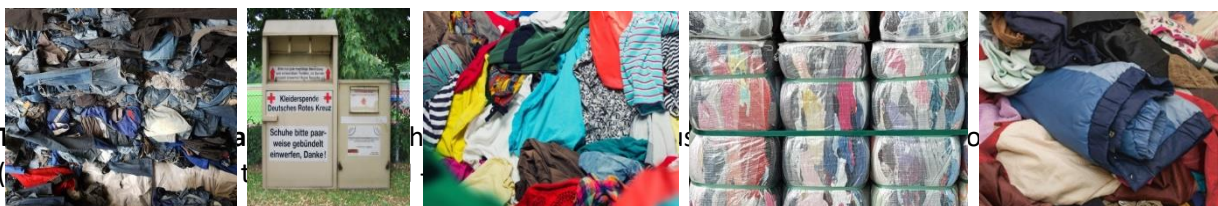
The possibility of their reuse depends on the availability and capacity of technologies that can repeatedly recover raw material from such waste, which can be further processed efficiently.

Mechanical, thermal and chemical technologies with the necessary accompanying procedures (according to quality, colour and material composition) are most often used for the reprocessing of textile waste (Data on the EU Textile Ecosystem and its Competitiveness Request for Services 896/PP/2020/FC).

Mechanical Recycling

Processing: The traditional method of textile waste recycling is the use of cutting and tearing processes to obtain reclaimed fibres. Fibre/thread opening is carried out by breaking the textile structure through cutting, shredding and tearing to produce reclaimed fibres. By mechanical processes, such as carding, a web formation can follow subsequently.

Use of reclaimed fibres: The material obtained is mostly used for the manufacturing of fibre nonwovens (i.e., needle-punched or stitch-bonded nonwovens) or for the production of cleaning rags, filling material, insulation material, geotextiles, upholstery and automotive textiles, which means a secondary use of waste.

The recycled fibre blends can also be spun into low-impact premium yarns for all types of fashion, accessory and home textile products, in a full spectrum of accurate and unique colours.

Thermal Recycling (Extrusion)

Physical recycling is feasible for thermoplastic materials and the waste is re-granulated and can be used as raw material again. The primary criterion for this mechanical recycling (melt processing) is the purity of the end product. Therefore, the waste must be sorted prior to recycling.

A main problem in the physical recycling (re-melting) of thermoplastic material is that reprocessing has a heat impact on the material causing a change of properties (the quality of recycled material is not the same as of virgin material) - effects of recycling processes on physical, mechanical and degradation properties can be decreased tensile properties, changed thermal characteristics, photo-sensitivity or a worse degradation behaviour.

Chemical Recycling

Chemical recycling is the production of chemical products from waste polymeric materials by depolymerisation into monomers with a purity level suitable for re-polymerization of material, but also dissolving with suitable solvents, while maintaining the polymer character. Other methods for chemical recycling are pyrolysis (depolymeri-sation by means of selected parameters, use of catalysts and heat) or targeted depolymerisation processes (like hydrolysis, alcoho-lysis, ammonolysis,).

Reprocessed material: Suitable for chemical recycling are polymers from cellulose, polyester, polyamide, polyurethane. Chemical recycling can be applied to recycle mixed or unmixed synthetic textile waste and gained products can be easily returned into the production cycle.

3. Textile labelling and the responsibility of producers and consumers to minimise the environmental impact of textile products

Technical standards

Technical standards are documents that set out requirements for specific products, materials, components, systems, or services, or describe specific methods and procedures in detail. They provide individuals, companies and various organisations with a common basis for mutual understanding. They are especially useful for communication between manufacturers, suppliers, customers, distributors and end customers in terms of the quality of textiles and textile products. They are necessary not only for the production but also for securing the textile trade in general. They are developed by consensus and approved by recognised standardisation bodies (EUR-Lex - 32012R1025; Act No. 22/1997 Sb.; ÚNMZ).

Technical standards are not generally mandatory, which means that companies and other organisations are not required to use them. Their validity is usually given by another regulation or by mutual agreement in the form of a contract. However, in some cases, standards can facilitate compliance with legislation, such as those contained in European directives and regulations. The so-called harmonised standards - enable companies to ensure that their products / services comply with the essential requirements set out in European legislation (directives) (EUR-Lex - 32012R1025; Act No. 22/1997 Sb.; ÚNMZ).

Types of standards

There are <u>international standards, national standards, industrial standards, association standards, corporate standards</u> - internal, which is the aspect of differentiation according to the scope. European standards must be incorporated into the national standards of the EU Member States (EUR-Lex - 32012R1025; Act No. 22/1997 Sb.; ÚNMZ) within six months. If an international or European standard is incorporated into an EU country's national system, then the national system of standards must be adjusted accordingly. For example, if an international or European standard is incorporated into the system of Czech standards with the designation ČSN xx xxxx, then the marking is adjusted (ČSN ISO, ČSN EN ISO, ČSN EN…). This marking is regulated in the same way in other European countries. Other types of national standards are e.g. STN (Slovak Technical Standard, Slovak Republic), DIN (German Industrial Standard, Federal Republic of Germany), BS (British Standard, Great Britain), ÖNORM (Austrian Standard, Austria), ASTM (American Society for Testing and Materials, USA), etc. The transposition of international standards into national standards by Member States is voluntary (EUR-Lex - 32012R1025; Act No. 22/1997 Sb.; ÚNMZ).

Who defines, creates and implements technical standards?

Technical standards introduced by **national standardisation bodies** (e.g. CEN - or CENLEK or ETSI members) **can develop their own national standards and** also contribute to the development and adoption of standards at European and international level. They provide information on all types of technical standards and bring together business, industry representatives and other stakeholders, such as consumer organisations, environmental groups and safety and health organisations.

European standards are developed and published by **European standardisation organisations: the European Committee for Standardisation (CEN)**, the European Committee for Electrotechnical Standardisation (CENELEC) and the European Telecommunications Standards Institute (ETSI). The elaboration and definition of standards is performed by experts in the Technical Commissions, who are appointed by individual stakeholders. International Standards are developed and published by international standards organisations: the International Organisation for Standardisation (ISO), the International Electrotechnical Commission (IEC) and the International Telecommunication Union (ITU). International standards are particularly important as a means of facilitating trade between different countries (EUR-Lex - 32012R1025; Act No. 22/1997 Sb.; ÚNMZ).

The **International Organisation for Standardisation (ISO)** was founded in Geneva, in1947, and now has 165 members from various countries (full membership, associate membership, and candidates for membership). The International Organisation for Standardisation deals with the creation of international ISO standards and other types of documents in selected areas of standardisation (TS - technical specifications, TR - technical reports, PAS - publicly available specifications, TTA - agreements on technical trends, IWA - agreements from industry working conference, ISO guidelines) (ISO standards).

Labelling of textiles

Products placed on the EU market must comply with the labelling rules. These rules are based on EU regulations (EUR-Lex - 32011R1007; Textile Label - Your Europe. (n.d.)). The product label must be firmly affixed and the information on it must be in all the official languages of the Member States for whose markets it is intended. Products consisting of at least 80% textile fibres are considered to be

textile.

The label always states

- the name of the product, the name of the manufacturer or importer ev. supplier,
- **material composition,**
- **size or dimensions,**
- **information on maintenance with symbols for care,**
- information whether it is a product for children under three years.

The **material composition**, indicating the types and contents of the individual fibres in descending order, must comply with EU Regulation (EUR-Lex - 32011R1007; Textile Label - Your Europe. (n.d.)). In fact, products marked "100%", "only" or "pure" may contain up to 2% of other material in accordance with the regulation and, where the product is made of carded yarn, up to 5% of extraneous fibres, if necessary from the point of view of production.

Textile products must also be marked in terms of **size** and appropriate maintenance. The size range is usually marked in accordance with EN 13402-3: 2014. The size system introduced in the standard is used to assemble **standard garment sizes**. A number of primary and secondary dimensions for defining body size are classified for men, women, boys, girls and children. The tables of individual categories contain not only dimensions but also the respective intervals and their ranges. The inconsistency of labelling is due to the fact that **different countries may use different types of size labelling**, which then need to be clearly presented to the consumer or allowed to convert to each other (European Standard EN 13402-3:2014). Most sizes are given numerically (e.g. 36, 38, 40, 42) or written (e.g. XS, S, M, L, XL) using pictograms showing the figure with the values of measured circumferential and longitudinal dimensions.

Maintenance symbols

The care of textile products is crucial and recommendations for use by customers are now essential. The international system of care symbols is introduced by a standard that has been adapted to the European system of standards EN ISO 3758: 2012. The use of symbols is protected by a trademark. If the consumer follows the care procedures on the product label, the quality and characteristics of the product should be maintained. Care recommendations are given as the maximum possible load of the textile product. In case, the consumer uses a higher load of the textile product beyond the recommendations (higher washing temperature, higher ironing temperature, or chooses a procedure that mechanically loads the product more than the recommended care), irreversible changes may occur to the product which will not be covered by product warranty.

Source: SOTEX GINETEX CZ (www.sotex.cz)

Clothing & Textiles Regulations in the European Union: A Video Tutorial by Compliance Gate (on youtube: https://www.youtube.com/watch?v=QEkKxiZL39w)

Product Labelling Requirements in the European Union by Compliance Gate
(https://www.youtube.com/watch?v=cAUVlekzidM)

Webinar // Textile Fibre Labelling for EU Market by TÜV SÜS
(https://www.youtube.com/watch?v=zdFVR4NjsTs)

Safety and sustainability of technologies and textile products

EU Member States strive to introduce and promote sustainable technologies and products with minimal environmental impact. Over time, documents are gradually being created that seek to define processes and technologies for sustainable production, beyond textile products.

These include regulations for Tanning of Hides and Skins (Best Available Techniques (BAT) Reference Document for the Tanning of Hides and Skins: Industrial Emissions Directive 2010/75/EU) and regulations for sustainable textile technologies (Best Available Techniques (BAT) Reference Document for the Tanning of Hides and Skins: Industrial Emissions Directive 2010/75/EU). The General Product Safety Regulation (2001/95 / EC), has been applied generally to all consumer goods, including textiles, since 2002, and the rules for the definition of safe products. The Rapid Alert System for Non-Food Products (RAPEX) (EUR-Lex - 32001L0095) is also in place, listing all products that have been withdrawn by national authorities in accordance with this regulation. This general directive follows the REACH (Registration, Evaluation, Authorization and Restriction of Chemicals) 1907/2006, which is a continuously updated list of regulated chemicals in the EU. The REACH aims to improve the protection of human health and the environment from the risks that can be caused by chemicals, while increasing the competitiveness of the EU chemical industry. The alternative methods of substance risk assessment to reduce the number of animal tests is also supported.

Certification of textile goods

The product certification process is a conformity assessment realised by an authorised body or accredited body and verifies that products or activities relating to its manufacturing or its reuse comply with the technical requirements specified in the certificate. For certified products, a risk analysis takes place in an accredited laboratory and a set of properties and requirements for the given product is monitored with regard to its purpose of end use. The certificate is granted only if the product or production process meets all requirements. If a quality certificate is granted, quality verification during its validity is carried out in the form of supervision over the quality stability of the certified product. The granting of a certificate is usually accompanied by the licensing of a certification mark. **Certification is performed by certification bodies and testing is, in most cases, performed by professionally accredited testing laboratories in accordance with established standards.** There are a

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number of quality labels used for labelling of an organic or eco-friendly product, including technology for its production, while maintaining standards related to, for example, compliance with fair rules in terms of working conditions, remuneration, etc. Some of them are listed below, but there are many more:

- **ÖKO-TEX®**

The ÖKO-TEX® international textile inspection system is used for labelling products made of non-hazardous materials. The system has been used since 1992 and guarantees health safety to users (OEKO-TEX® - Tailor-made solutions for the textile and leather industry). An independent association with seventeen research and texting institutes worldwide verify the quality of products and certify by ÖKO-TEX "Standard 100". The criteria and selected properties are updated and tightened in accordance with scientific knowledge, the development of technologies and materials. ÖKO-TEX® uses stricter limit values of individual monitored parameters, which exceed the valid national and international standards. Regular audits of not only final products, but also all technological processes during their production contribute to the responsible use of chemicals and harmful substances. The criteria for tested textiles include monitoring of pH, possible content of pesticides, formaldehyde, heavy metals and preservatives. The possible presence of carcinogenic substances in dyes and eventual presence of allergenic components. This certificate guarantees that the product has been manufactured using sustainable processes under socially responsible working conditions. Each product marked "Made in Green" can be traced using a unique product ID or QR code listed on the label or website (OEKO-TEX® - Tailor-made solutions for the textile and leather industry).

- **EU Ecolabel**

    "EU Ecolabel" covers a wide range of product groups, from the main production areas to tourist accommodation. For each product group, experts develop and select criteria that must be followed to reduce the main environmental impacts throughout the product life cycle. The criteria are defined with regard to the type and purpose of use of the products and are revised in regular 4-year cycles to reflect technical innovation, materials and technology development or emission reductions and market changes (EU EkoLabel Textile Product). Textiles marked with the "EU Ecolabel" label must meet criteria guaranteeing the limited use of substances harmful to health and the environment, the reduction of water and air pollution, the resistance of the dye to sweat, washing, wet and dry friction and light. The EU Ecolabel criteria also encourages companies to develop products that are durable, easy to repair and recycle.

    The EU Ecolabel is a voluntary scheme, which means that producers, importers and retailers can choose to apply for the label for their products.

- **Global Organic Textile Standard (GOTS)**

    "GOTS" is a complex system of certification used in the fashion industry. It includes the processing, production, packaging, labelling and distribution of all textiles made from at least 70% of certified organic natural fibres. The final product must not contain allergenic, carcinogenic or toxic chemicals. A higher level of certification (organic / bio) is used for the labelling of textiles and textile products if they are made from more than 95% of certified organic natural fibres (Seitenwerkstatt, D. (n.d.)). Textile products must meet a certain set of environmental standards, social standards with a minimum conditions. This certification includes a ban on child labor, an adequate wage and working hours, protection against discrimination, etc.(Seitenwerkstatt, D. (n.d.)).

- **BLUDESIGN**

    "The Blue Way" of "Bluedesign" represents a vision of responsible and sustainable production of textile products. "Bluedesign" is a system that provides safer and more sustainable

environments for people to work in and everyone to live in. Powered by a holistic approach, BLUESIGN traces each textile's path along the manufacturing process, making improvements at every stage from factory floor to finished product. "Bluedesign" changes the environmental impact of textiles for good. As a solution provider and knowledge broker, BLUESIGN acts as an independent verifier to secure trust and transparency (bluesign® - solutions and services for a sustainable textile industry. (n.d.)).

- **Textile Exchange**

Textile Exchange is a global non-profit organisation that creates leaders in the preferred fibre and materials and textile industry aiming to reduce environmental impact. It develops, manages and promotes a set of industry standards and also collects and publishes critical industry data and knowledge that enables brands and retailers to measure, manage and monitor compliance with these standards. These include e.g.: OCS (Organic Content Standard), GRS (Global Recycled Standard), RCS (Recycled Claim Standard), RDS (Responsible Down Standard), RMS Responsible Mohair Standard, RAS (Responsible Alpaca Standard), CCS (Content Claim Standard). Members who meet all the requirements of the selected certificates or standards are then awarded (Home - Textile Exchange).

- **Cradel to cradel**

Cradle to Cradle Certified™ (Cradle to Cradle certification) is a globally recognized measure of safer, more sustainable products made for the circular economy.

Product designers, manufacturers and brands around the world rely on the Cradle-to-Cradle Certified Product Standard as a transformative pathway for designing and making products with a positive impact on people and planet. From fragrances to flooring, t-shirts and jeans to water bottles and window treatments, thousands of products are Cradle to Cradle Certified. What's more, a growing number of brands, organisations and standards also recognize Cradle to Cradle Certified as a preferred product standard for responsible purchasing decisions.

To receive certification, products are assessed for environmental and social performance across five critical sustainability categories: material health, material reuse, renewable energy and carbon management, water stewardship, and social fairness.

- **Textile environmental impact: the Higg index**
The Higg index is a textile materials classification tool created by the SAC (Sustainable Apparel Coalition) that:

- It allows to compare some textile materials with others.

- Available to the public.

- Facilitates the design of more sustainable products.

The Higg Materials Sustainability Index (MSI) provides access to a large amount of relevant information about the impacts of material production used in the apparel, footwear, and home textile industries. You can leverage the information in different ways to get a clear understanding of what is causing different types of material impacts, and different production processes that can be used to reduce those impacts.

4. Definition of textile product quality and its testing

### Eco-design and life cycle of products

The environmental management systems - Guidelines for incorporating ecodesign is defined in ISO 14006:2020. The whole life cycle has to be taken into consideration when the relevant environmental aspects of a product are described. The following interlinked stages influence the length of life cycle of a product:material acquisition, design and development, manufacturing, delivery and installation, use (including reuse, maintenance, repair, remanufacturing, refurbishing, and upgrading), end-of-life treatment and disposal (ISO 14006:2020; Dienstverlening - Website NL - Demo Environment. (n.d.)). Nowadays, the textile product with longer period of use is preferred and the reasons lie in economical savings. Closing a production loop through recycling will also increase the environmental benefits. Responsible production and the implementation of EN ISO 9000 are the sole processes that can assist in doing so (EN ISO 9000 (2015)).

Various tests to determine the quality of different textile products

There are many types of textile products that are manufactured for specific purposes and, therefore, the expectations and demands for their quality vary. To be able to set the qualitative criteria and select a suitable testing methodology for quality evaluation of various textile products, it is necessary to define the categories respecting the end use of textile goods. Identifying the end-of-life reasons of a textile product in all categories and subcategories is the first step. Linking those reasons to a product quality parameter has to follow together with finding a possible adaptation of existing production technologies for achieving a possible improvement or innovation in the existing production processes. In accordance with ecodesign the emphasis to the prolongation of life and responsible production is essential. The next step has to be transforming the customer's requirements to qualitative characteristics and finding optimal ways of measuring. Finally, the quality of textile products in a long period of time at different phases of their use should be evaluated to be able to set qualitative priorities and limits for minimal standard l (EN ISO 9000 (2015); Ecodesign Criteria for Consumer Textiles).

The 7 examples shown in the figure above indicate how to select the qualitative criteria, find an appropriate testing methodology, set the priorities for qualitative criteria including minimal standard (Ecodesign Criteria for Consumer Textiles). Durability and appearance are the only user qualitative parameters, recommended for the evaluation of textile goods' quality. On the other hand, mainly for clothing, comfort should not be omitted.
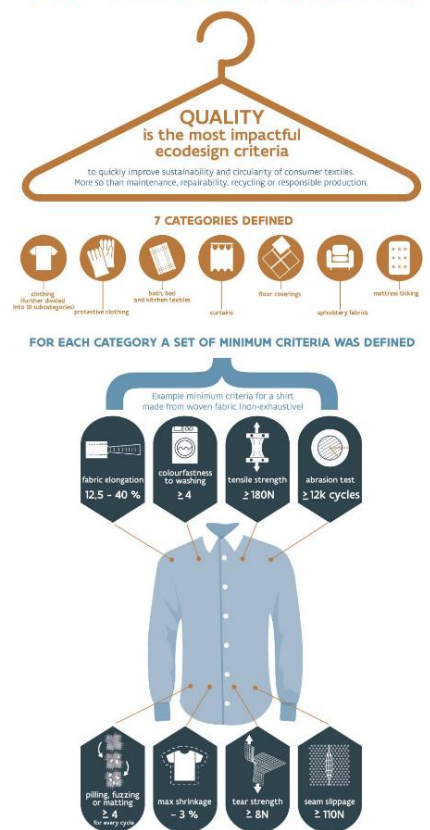
Key-quality criteria for clothing (Eco-design Criteria for Consumer Textiles)

General physical criteria

- o **Tensile strength** - indicating how strong the fabric is and thus how long the fabric will be in use.
- o **Tear strength** - the appearance of tears in the fabric during use.
- o **Seam strength** - the strength needed to break open a seam, marking the end-of-life of the textile product if the fabric is riffed out.

o **Seam slippage** - the ability of a fabric to slip out of a seam due to the sliding of the yarns in the fabric. When the fabric slides out of the seam the fabric is unravelled.

o **Abrasion** - the resistance to rubbing a fabric against surfaces.

o **Pilling** - the formation of little fibrous balls on a fabric formed by fibre-ends sticking out of the fabric that mingle with each other or fibre contaminations on the fabric.

o **Dimensional stability** - the change in dimensions of a garment after washing. In most cases this is shrinkage, but with knitted fabrics it is possible that an enlargement appears.

o **Visible change after washing** - If the item changes to a great extent, it may be discarded by the user.

● **Colour fastness**

o **Colour fastness washing** - visual colour changes after washing,

o **Colour fastness rubbing** - effects of rubbing a fabric against another fabric

o **Colour fastness perspiration (sweat)** - colour changes in a textile under the influence of human perspiration

o **Colour fastness water** - when textile is wet and comes into contact with another piece of textile the colour might stain

o **Colour fastness to light** - colour broken down under the influence of light.

Where and how testing of textile takes place

Testing and quality verification is an integral part of mutual cooperation between manufacturers, customers, traders and customers. The actual testing takes place in accredited or certified laboratories equipped with special measuring technologies and experts, who can also perform expertise, expert consultations and assessments. Outputs of testing are protocols, evaluation reports or quality certificates. In addition to testing in defined areas, most institutions also deal with education and training. Within the EU, there are a number of professional accredited workplaces, some of which also deal with R & D & I activities related to the development of new textile materials, technologies, products and the way they are evaluated in order to ensure sustainable development and reduce environmental impact. Most of which also certify technologies and products under the auspices of EKOETEX. Testing institutes not only for textile materials and products from them for clothing and technical textiles located in the EU can be find on interactive map via this link.
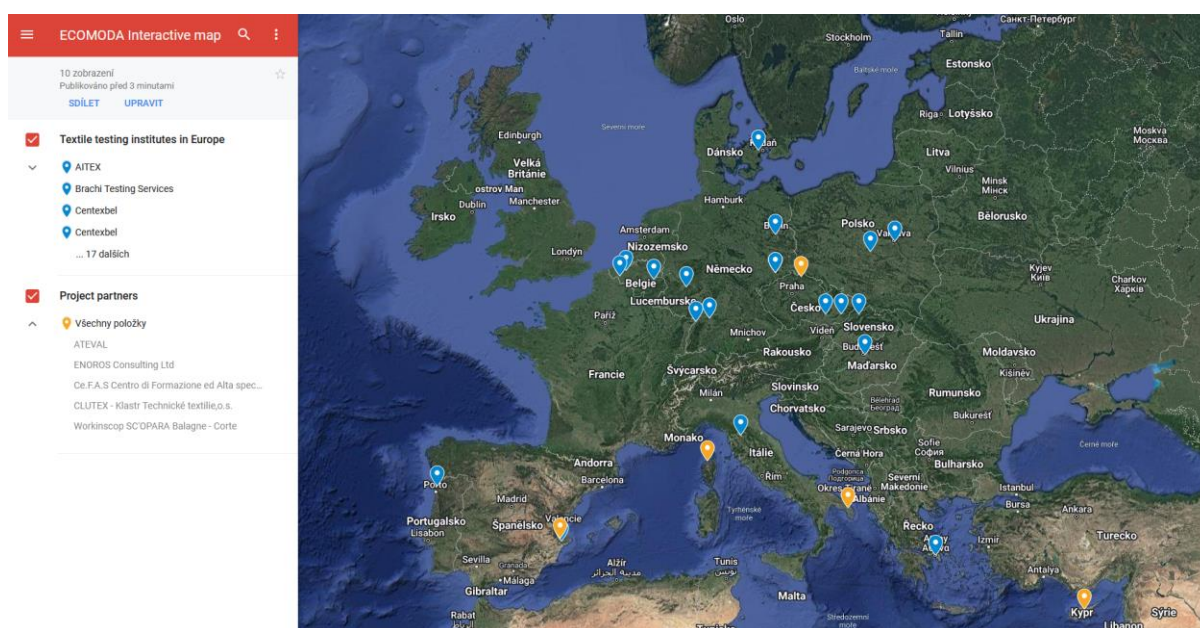
Self-evaluation test

Read the assignment carefully and choose the correct answer. Only one of the given options is correct. Check your answers below the test.

1. What is the main objective of sustainable development?

a) Minimising production and banning conventional production, to avoid environmental impact.

b) Ensuring economic development through the depletion of as little natural resources as possible

c) Maximising production and profit regardless of the environmental consequences.

2. How can the concept of circular economy be utilised in the textile industry?

a) by using raw materials, to create products which turn to waste after their use.

b) by producing goods using environmentally friendly materials, and discarding them at the end of their life-cycle.

c) by offering solutions that minimise waste generation by closing material flows in functional and never-ending cycles, where raw materials do not lose value.

3. How can textile materials be recycled?

a) by disposing of them in landfills, where they will gradually decompose.

b) the mechanical, thermal and chemical technologies can be used for the repeated reprocessing of textile waste.

c) Limit the disposal of textile products after the end of their life cycle for incineration with the possible use of the obtained energy in the form of electricity or heat and thereby reduce the need to dispose of them in any way.

4. What does the certification process involve?

a) In accordance with the marketing strategy, the manufacturer, in agreement with the distributor, defines the properties that the product has and these are then used as part of the promotional campaign, on the product label and accompanying documents.

b) Compliance of the properties of the certified product with the technical regulation is realised as a risk analysis in an accredited laboratory. A set of properties and requirements for the given product is monitored with regard to its purpose of use.

c) Determining the set of properties of the selected products in a laboratory and creating a protocol on their detection in the laboratory and handing over this data to the client.

5. What is Bluedesign?

a) A vision of responsible and sustainable production of textile products.

b) The latest fashion collection inspired by navy blue.

c) The use of blue not only in clothing collections, but in all products including architecture.

Correct answers: 1. b); 2. c); 3. b); 4. b; 5. a)

Terminology

Linear versus circular economy

A circular economy is fundamentally different from a linear economy. To put it simply, in a linear economy we mine raw materials that we process into a product that is thrown away after use. In a circular economy, we close the cycles of all these raw materials. Closing these cycles requires much more than just recycling.
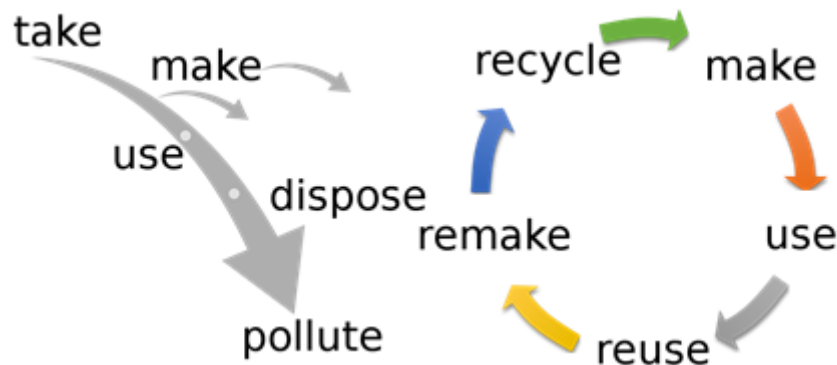
Certification process

The product certification process is a conformity assessment realised by an authorised body or accredited body and verifies that products or activities relating to its manufacturing or its reuse comply with the technical requirements specified in the certificate. For certified products, a risk analysis takes place in an accredited laboratory and a set of properties and requirements for the given product is monitored with regard to its purpose of end use.

Recycling

Recycling is any method of waste utilisation by which waste is reprocessed into products, materials or substances, either for their original use or for other purposes, including the processing of organic materials.

Technical standards

They are documents that set requirements for specific products, materials, components, systems or services, or describe in detail specific methods and procedures.
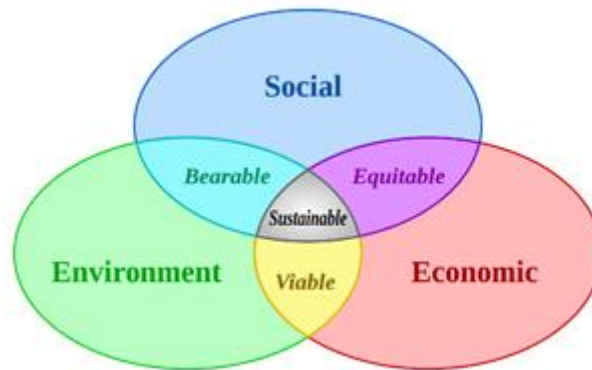

Textile product label

The product label must be firmly affixed and the information on it must be in all the official languages of the Member States for whose markets it is intended. The label always states: the name of the product, the name of the manufacturer or importer ev. supplier, material composition, size or dimensions, information on maintenance with symbols for care, information whether it is a product for children under three years.

Sustainable development and technology

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Activities

Title	The textile labelling and way of laundry guide
Minimum number of people to be involved	2
Activity Objectives	● Get to know the symbols used to label textiles and study the ways for sustainable textile care.
Materials to be used	
Time requested in minutes	2 hours 1 hour individual work and 1 hour presentation, discussion and suggestions.
Implementation: please, describe the phases of how the activity has to be carried out.	**Individual or group activity - questions for discussion:** 1. Do you know the symbols for textile care? How many correct meanings did you know? Did you find a symbol that you are seeing for the first time? 2. Try to say according to the given picture what the material composition of the given textile is and how you will treat the textile.

3. Try to find the tags on your clothes (if you haven't cut them off) and make sure you know how to care for these textile products. Discuss with others.

4. What types of clothing require special care and why?

5. Do you know that the app can help you with proper care of your clothes?

Further resources to be used (link, videos, tools)	You can use the website of GINETEX (The International association for textile care labelling), which contains short instructional videos and explanatory texts (Ginetex is represented by Sotex Ginetex CZ in the Czech Republic – a member of cluster Clutex z.s., other partners are on the web page). **The additional study material:** Lower the temperature when machine washing Don't wash your clothes too often Think of reducing the amount you tumble dry Think of ironing only when necessary Use dry clean only when necessary Clevercare info

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ECOMODA Training Course – Conclusion

Enoros Consulting

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1

Congratulations, you have completed the ECOMODA Training Course!
More specifically in this learning journey, you have learned:

How to leave your mark in the fashion world:
- By looking into the history of fashion
- Through an introduction into the different careers in the world of fashion
- Through tips on how to start a career in fashion
- By looking into the essential theoretical and soft skills for making it into the fashion industry
- By identifying the top qualities of successful fashion designers
- Through effective communication practices
- By learning secrets and tricks of the trade

About green and digital transition:
- Through key-facts about fashion's environmental impact
- By looking into the pandemic's impact on consumer habits
- Through an introduction into fashtech and the need to switch to more sustainable business models and services in fashion
- By looking into the traditional and new production models

About the Fashion Management and Media Marketing:
- Through the basics of fashion management, its brief history from the mid-19th century and its main manufacturing categories
- Through an introduction to the fashion supply chain and its different levels of operations
- By looking at the examples of cashmere and the biodiversity crisis
- Through tools to develop a good marketing strategy for managing a fashion brand

About textile quality and its evaluation via testing:
- Through a brief introduction to the terms related to sustainable development, technologies and products
- Through a presentation of the general data about consumption of textiles and textile waste and an action plan for circular economy in textile
- Through the introduction of the types of textile waste and its possible reuse, the basic procedures for textile waste recycling and the sustainable technologies in general with practical examples.
- Through information on selected topics such as:
  - What are standards and why is it good to use them?
  - How to find your way around the system of standards?
  - Who creates them and how and what they are used for?
  - Why and when is it necessary to follow them?
- Through an introduction to textile labeling and the responsibility of producers and consumers to minimize the environmental impact of textile products
- Through knowledge about eco-design and the life cycle of products, how to define the minimum criteria for different types of textile products and how and where the quality of textile and textile products can be tested.

You are now ready and confident to face the challenges of the sustainable fashion world with more:

Awareness

- of the principles of fashion styling and creative direction
- of the personal qualities to be cultivated for a succesful career as a creative director
- of how to leave your mark in the fashion world
- of how marketing can help in promoting your brand
- of how to promote and provide information about textile testing

Willingness

- to develop and exercise new creative skills that will help you built your career and manage new challenges in the world of fashion
- to think about your long-term impact in the fashion industry, discover new tools to promote your brand and manage every challenge
- to be informed about the impact of textile testing and employ different approaches
- to devote time to learn about quality control testing and how it can help reduce the negative impact on the environment

Appreciation

- of practical approaches in styling and how it can help with staying competitive
- of the importance of connecting and sharing
- towards 3R model (Reduce, Reuse, Recycle) benefits
- of the importance of fashion communication

Openess

- to identify weaknesses and try to transform them into strengths for your personal career development and wellbeing
- to discuss production, sales, advertising, etc. with other people in the fashion industry

If you wish to learn more about sustainability and the fashion world, have a look at the following free online courses and articles:

Course 1: Sustainable Fashion
Content: Business model theory as a foundation to look at how real-world fashion brands are adopting more sustainable ways of doing business.
Learning outcomes: • Understanding the overall challenges and potential solutions for businesses to become more sustainable; • learn about the challenges and opportunities of circular business models; • introduction to the various tools that companies use to measure and report sustainability.
Offered by: Copenhagen Business School
Course Link: https://www.coursera.org/learn/sustainable-fashion

Course 2: Circular Fashion: Design, Science and Value in a Sustainable Clothing Industry
Content: Provide designers, retailers, scientists, engineers, etc. in the industry with holistic insights of the complex challenges of circular fashion, while engaging you to start the transition towards circularity for your personal and/or professional practices.
Learning outcomes: • The difference between sustainability & circularity; • Ecosystem circularity and closing the loop in fashion; • Biobased innovation and new materialism; • Business as crafting value.
Offered by: Wageningen university, Hague university
Course Link: shorturl.at/iBMN5

Course 3: Fashion's Future: The Sustainable Development Goals
Content: Explore the fashion industry's impact on the people and the planet, Sustainable Development Goals, and the link between the two.
Learning outcomes: • Assess brand's sustainability disclosure to better understand their efforts to improve their human rights and environmental impacts; • Develop an understanding of global clothing supply chains and their impact on the people and the planet; • Develop an understanding of Sustainable Development Goals and how they relate to the clothes you wear; • Debate how the fashion industry interlinks with the Sustainable Development Goals and how we can all help achieve them.
Offered by: Fashion Revolution - global movement campaigning for systemic reform of the fashion industry
Course Link: https://www.futurelearn.com/courses/fashion-s-future-and-the-un-sustainable-development-goals-

Course 4: Fashion and Sustainability: Understanding Luxury Fashion in a Changing World
Content: Introduction to issues, agendas and contexts relating to fashion and sustainability in a changing world.
Learning outcomes: • Discuss the complex nature of sustainability through the introduction to materials sourcing for luxury fashion;

- Apply understanding of fashion & sustainability knowledge and reflection to your practice through manifesto creation and design thinking processes;
- Demonstrate a critical understanding of key sustainability agendas;
- Develop innovative approaches to fashion for ecological resilience and thriving societies.

Offered by: London College of Fashion's Centre for Sustainable Fashion

Course Link: https://www.futurelearn.com/courses/fashion-and-sustainability

Course 5: Who Made My Clothes?

Content: Discover who made your clothes, share their stories, and find out how you can influence global change.

Learning outcomes:
- Explain garment supply chains and explore the interdependence of places, resources, and the people upon which supply chains rely;
- Investigate your own clothing: its brand, where it was made, and from what;
- Identify and employ search techniques for investigating the policies employed by clothing brands, and the human stories behind them;
- Demonstrate empathetic writing about the stories of garment production;
- Reflect on how to use your findings to influence brands.

Offered by: Global movement Fashion Revolution

Course Link: shorturl.at/qIJW3

Articles/Reports:

Effective Disclosure in the Fast-Fashion Industry: from Sustainability Reporting to Action

Key challenges for the fashion industry in tackling climate change

Making Resilient Decisions for Sustainable Circularity of Fashion

Sustainability and Resilience after COVID-19: A Circular Premium in the Fashion Industry

The environmental price of fast fashion

Trends in the Fashion Industry. The Perception of Sustainability and Circular Economy: A Gender/Generation Quantitative Approach

Sustainable fashion: New approaches

Innovative and sustainable business models in the fashion industry: Entrepreneurial drivers, opportunities, and challenges

Exploring the Relationship Between Business Model Innovation, Corporate Sustainability, and Organisational Values within the Fashion Industry

ecomoda
Reforming of fashion industry by using ECO-friendly practices

"Buy less. Choose well. Make it last"
-Vivienne Westwood

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