Unit 2 Environmental issues in the T&C Industry
Lecture 2.5 Eco friendly practices for jeans production

D 2.1 Training toolkit and e-book

June 2021 – Marianna Maglara Morneau
& Athanase Contargyris (CEDECS-TCBL)

Co-funded by the Erasmus+ Programme of the European Union

WINTEX project (Weaving innovation among academia and industry in the Tunisian textile sector; project reference number 610373-EPP-1-2019-1-ES-EPPKA2-CBHE-JP) **is co-funded by the Erasmus+ programme of the European Union.**

Lecture 2.5 Eco friendly practices for jeans production

Co-funded by the Erasmus+ Programme of the European Union

WINTEX project is co-funded by the Erasmus+ programme of the European Union. The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Origins of a success story

- A good pair of jeans is a chief element of a modern-day wardrobe, which is both fashionable and durable. Large amount of greenhouse gases is released from the denim manufacturing processes and its impact on the environment is not so happening, as this ever-fashionable garment. This justifies to study what alternative production processes and business models can make more ecofriendly their production.
- The contemporary use of the word "jeans" comes from the French word for Genoa, Italy (Gênes), where a fabric known as jean pops up in the history books as early as the 15th century. This textile, was originally a blend of wool and cotton (unlike the silk used in original denim).

Co-funded by the Erasmus+ Programme of the European Union

WINTEX project is co-funded by the Erasmus+ programme of the European Union. The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

The legendary jeans …

Contemporary jeans are associate to “Denim”, a fabric whose name comes from the name from its city of origin, Nîmes in France.

Denim as it is recognized today was indeed first produced in Nîmes, France, at the end of the 17th century, when the city was a textile district.

The legendary US version of jeans (the Levi’s jeans) was invented in California in 1873. This denim jean was originally manufactured using denim or dungaree cloth, a type of pure cotton 3/1 twill woven fabric with indigo dyed warp yarns and undyed weft. This meant the face side was dominated by indigo dyed warps, with an underside of undyed wefts. This effect, when combined with different washing techniques, has helped create the distinctive worn-out appearance. Denim was traditionally colored blue with indigo dye to make blue jeans, although "jean" formerly denoted a different, lighter, cotton fabric.

Co-funded by the Erasmus+ Programme of the European Union

WINTEX project is co-funded by the Erasmus+ programme of the European Union. The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Sustainability & social concerns (1/2)

The world's favorite clothing article, the denim jean, is also one that has traditionally had major negative impacts on the environment through its production chain.

Sustainability issues

Water :. According to WWF, it takes over 20,000 liters of water to produce 1 kilogram (2.2 pounds) of cotton, roughly equivalent to just one 1-shirt and a pair of jeans. In fact, 3% of the total amount of water consumed by agriculture is exclusively used to grow cotton. Beyond the fields, denim production is also very water intensive. A typical pair of denim jeans is washed at least twice prior to being sold, to help soften the fabric and remove dye.

Energy intensive production : High energy consumer during the user phase

Chemicals:Denim production often involves the use of chemicals. To begin with, insecticide and pesticides are commonly used in cotton agriculture. In fact, cotton, which makes up 2.4% of the world's crop land, accounts for a staggering 24% and 11% of global sales of insecticide and pesticides, respectively.

Major environmental consequences

- Irresponsible use and disposal of dyes or chemicals used in the production process can have devasting consequences.

- Chemicals not properly treated before disposal can lead to serious pollution problems. The East River in Xintang, China, whose factories produce 300 million denim articles per year, has turned blue due to wastewater from dyeing being dumped directly into the river.

Co-funded by the Erasmus+ Programme of the European Union

WINTEX project is co-funded by the Erasmus+ programme of the European Union. The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Sustainability & Social Concerns (2/2)

Labor Risks

Denim has also been associated with labor injustices along the entire supply chain.

On the production floor, sandblasting—a process used to make denim look more worn and faded—can seriously damage workers' health and lead to silicosis, a potentially lethal pulmonary disease. This risk becomes even greater when sandblasting is performed without proper equipment. A 2012 report estimates that 5,000 or more sandblasting workers in Turkey have been infected with silicosis. While Turkey banned the practice in 2009, sandblasting has since moved to less regulated countries such as Bangladesh, China, Pakistan, and Egypt.

Human Rights concerns

- For example, the cotton harvest in Uzbekistan—a major exporter of cotton—relies on modern slave labor. The Uzbek government regularly forces its citizens to pick cotton for extremely low wages. According to a 2016 survey by the Uzbek-German Forum for Human Rights (UGF), "almost universally, respondents told us they could not refuse to pick cotton

Co-funded by the Erasmus+ Programme of the European Union

WINTEX project is co-funded by the Erasmus+ programme of the European Union. The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

WINTEX

Five steps in the jean's production

1. **Weaving**: Denim jeans begin in the cotton fields, where workers pick the cotton that will ultimately be used to create denim material. Machines process the cotton, which is then twisted into thread and rolled onto large spools. The fabric is created by weaving vertical threads (warp) and horizontal threads (weft).
2. **Cutting**: A large pattern is mapped out onto the denim and cut using extremely sharp cutters. Anywhere between 20 to 200 layers of denim can be cut at once, depending on the thickness of the fabric.
3. **Sewing:** The pieces of denim are sewn together by skilled workers using complex machines and a variety of stitches, depending on where the stitches are placed.
4. **Distressing**: Today, jeans are commonly distressed by hand to provide a more worn-in look. This includes the use of sand, stones, dremel tools, or even shotgun pellets, as well as potassium acid, to achieve the desired look.
5. **Washing and drying**: Jeans are washed multiple times to bring down the color and prevent the indigo dye from bleeding

Co-funded by the Erasmus+ Programme of the European Union

WINTEX project is co-funded by the Erasmus+ programme of the European Union. The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

The toxicity impact assessment in Life Cycle Assessment …

Wet treatment

The bleaching/dyeing and finishing stage (wet treatment) is a major hotspot in terms of carcinogenic human toxicity, and also a hotspot for noncarcinogenic human toxicity in garments with a high proportion of synthetic fibres. During the jeans production is also a hotspot demanding a new approach.

Major hotspots

Production conditions and Human Rights issues

Co-funded by the Erasmus+ Programme of the European Union

WINTEX project is co-funded by the Erasmus+ programme of the European Union. The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

The Ecolabel approach in the jean's production

The globally dominating environmental ecolabel in the textile industry today is **OEKO-TEX® 100** (OEKO-TEX® Association, 2013), which guarantees the absence of a pre-defined set of toxic chemicals in the textile product, verified by laboratory testing.

Other common textile ecolabels are **Bluesign®** (BLUESIGN®, 2013) and the Global Organic Textile Standard **(GOTS, 2011),** both addressing the management of chemicals in the supply chain.

The ecolabel approach is to guarantee that certain criteria are met, and only tells whether the products meet the criteria or not. Ecolabels thus give little guidance to the comparative performance of textile production technologies. Another commonly used tool in the textile industry is the **MADE-BY** Fibre Benchmark (MADE-BY, 2013), which makes a non-comprehensive inclusion of chemical issues. This benchmark bases the chemical score on the most severe hazard phrase of any of the chemicals included in the production of a fibre, disregarding volumes, all other chemicals and whether there is a risk of exposure to the most hazardous chemical or not. Such a simplified tool can therefore provide misleading conclusions with regard to the environmental performance of textile products.

Jean's production is also referred to **Better Cotton initiative** and **Fair Trade** (related to the working conditions, wages, health & safety conditions)

Co-funded by the Erasmus+ Programme of the European Union

WINTEX project is co-funded by the Erasmus+ programme of the European Union. The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

The capacity building initiatives approach in the jean's production

The transition to sustainable and circular textile value chains requires all stakeholders, and especially businesses working in the sector, to have relevant knowledge and capacities.

For instance, the Smart Textiles Institute brings together strategic partnerships across academia, business and policy makers. Their innovations address the whole textile value chain from education to prototype, production and commercialization with over 500 research and company projects since its start in 2006. Examples are: textiles made from 100% paper, **recycling jeans**, redesigning fabrics to avoid waste, and printing without water.

Fashion for Good published a series of circular fashion guides that explain to companies how they can transition to certified circular supply chains, including a list of certified materials, sample project plans and business cases.

Co-funded by the Erasmus+ Programme of the European Union

WINTEX project is co-funded by the Erasmus+ programme of the European Union. The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

A journey towards sustainability…

Traditional approach

The popularity and variety of jeans, including different colors, has had a major impact on the environment. For example, fading often requires pumice stone washing with harsh chemicals that simultaneously or subsequently decompose the indigo dyes, and the distressed look may require up to 20 chemical-intensive washes.

Sustainable approach

New techniques to manufacture 'green jeans':

Recycling : Denim manufacturer in Sweden has made an effort to recycle 1600 tons of materials into new garments and has saved 50 million litres of water while manufacturing jeans.

New materials for the production : jeans entirely from cotton and recycled water bottles.

New developments like **waterless jeans** and growth of organic cotton industry have helped to maintain the sustainability approach.

Sustainable choices to go for : organic cotton, natural dyes, rivets and buttons made from natural or recycled materials

Co-funded by the Erasmus+ Programme of the European Union

WINTEX project is co-funded by the Erasmus+ programme of the European Union. The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

A journey towards sustainability…

Traditional denim

- Traditional denim production requires around 25 dyeing barrels and range of dangerous chemicals.
- Water & energy intensive process

versus

Advanced Denim

Advanced Denim process :

- needs just one barrel and advanced eco-safe, concentrated liquid sulfur dyes,

-prevents the wastewater generation by 8.3 million cubic meters and save 220 million kilowatt hours of electricity,

- reduces carbon dioxide released into the atmosphere yearly.

Co-funded by the Erasmus+ Programme of the European Union

WINTEX project is co-funded by the Erasmus+ programme of the European Union. The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

A journey towards sustainability…

Eco-friendly production

- Less water & Energy consumption
- Less chemicals
- Less pollution
- Less GHG

New methods

The budding green process can reduce:
- 92% of water consumption,

- 30% of energy consumption and almost no wastewater

- cotton waste by 87%, which is normally burned that add to the generation of carbon dioxide and other greenhouse gases into the atmosphere.

Co-funded by the Erasmus+ Programme of the European Union

WINTEX project is co-funded by the Erasmus+ programme of the European Union. The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Eco-friendly production solutions

Some of the ways the denim jean industry is adapting to changing regulations and the increasing demand from consumers for more sustainable products are the following:

Ozone washing : The process involves dampening the denim jeans and then exposing them to the ozone. It can achieve a desired level of bleaching in about 15 minutes. The ozone then reconverts to oxygen and is released safely into the environment. Dry ozone processes are also available, removing the need for bleach and water. This will create sustainable denim.

Chemicals being used are also changing : More eco-friendly bleaching chemical formulas and alternative dyestuffs mean less impact on the environment

Foam for the dyeing and finishing process which reduces the wet-pick-up rate significantly (20 percent to 30 percent), meaning fewer dyes and chemicals.

Nano-sized air bubbles instead of water to dye jeans, giving them both softness and wrinkle-repellent properties. Reducing water means reductions in chemicals and energy.

Co-funded by the Erasmus+ Programme of the European Union

WINTEX project is co-funded by the Erasmus+ programme of the European Union. The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Jeanologia solutions

Jeanologia, is a Spanish technological company with twenty years history which helps the transformation of the textile industry with disruptive technologies (laser and eco systems) that enhance productivity, reduce water and energy consumption and eliminate damaging emissions and waste, guaranteeing ZERO contamination.

Jeanologia solutions cover most of the production steps of jeans' production and use the most advanced laser and eco technologies for fabric and garment finishing, covering the most pressing needs of the market.

(https://www.jeanologia.com/products/)

Co-funded by the Erasmus+ Programme of the European Union

WINTEX project is co-funded by the Erasmus+ programme of the European Union. The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Business cases of green jeans production in Europe

Atelier Tuffery success story

The case of Atelier Tuffery in France a family-owned company of 125 years old defines its approach of business as a set of commitments and practices following "**Common Sense**" principles. *"As pioneers in French jeans and business leaders, common sense for us is simultaneously being manufacturers, being responsible, being sustainable, being human and being demanding."*

A clear vision, commitments & transparent proof of their principles and use of sustainable natural materials (hemp, cotton from Greece & Spain, materials from Nimes), respect of REACH regulations

1083 a start up reducing the jeans production footprint

The basic concept on which this French company was founded by two brothers in 2013 was to relocalise at less than 1083 kms (the maximum distance between cities in France) all the process of jeans production, while the production of conventional jeans makes them travel up to 65000 kms to be produced. 100% of their jeans are made out of biological cotton or recycled materials and are totally produced in France.

Co-funded by the Erasmus+ Programme of the European Union

WINTEX project is co-funded by the Erasmus+ programme of the European Union. The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Business cases of green jeans production in Europe

Sustainable brands

Denim companies in the last few years have offered some excellent green jeans options to the consumers globally. Some make jeans that use 100% organic cotton, while some use natural indigo dyes and others use bamboo buttons for jeans. There are denim companies that not only make trendy organic cotton jeans but give away some part of their profits to charitable organizations.

Some brands new or old make ethical and eco-friendly jeans from more earth-minded materials such as **organic cotton** (which uses less water and zero synthetic pesticides compared to conventional cotton), **surplus or deadstock fabric** (unused fabric that would otherwise be tossed out), or **up-cycled textiles** (fabric re-constructed from trashed clothes). They also are more mindful of their manufacturing processes, minimizing the use of toxic dyes and chemicals while maximizing water and energy efficiency where possible.

Major changes in the production

- Better cotton initiative
- Organic cotton
- Fair trade
- Upcycling
- Use of Renewable Energy

Co-funded by the Erasmus+ Programme of the European Union

WINTEX project is co-funded by the Erasmus+ programme of the European Union. The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Business cases of green jeans production in Europe

Examples of Sustainable brands approach

- **Warp + Weft** : For example, their Dry Ozone technology is an eco-friendly alternative to chemical bleach. Their factories are fully compliant with International **Social and Environmental & Quality Standards**, and pay fair wages to their employees.
- **Levi's** : **Sustainable cotton & recycling programs** They're part of the Better Cotton Initiative, and currently, over 20% of their cotton qualifies as Better Cotton. By 2020, their goal is to source 100% of their cotton from sustainable sources.
- **RE/done** : **Upcycled** vintage denim
- **Able** : **Fair wages**, provide economic opportunities for **women** in vulnerable areas
- **Outland Denim : Certified B Corp**. Sustainable employment and training opportunities to women who have experienced exploitation. Water consumption and energy reducing processes.
- **Nude Jeans:** Upcycling, members of Fair Wear Foundation, GOTS Certified, free repairs.
- **Bluer Denim** is part of **1% For The Planet** and they'll also recycle your old denim for you
- **Boyish :** Water and denim recycling, reduced indigo, factory sustainability audits. Boyish's factories are all regularly audited to ensure they meet high standards for social responsibility and sustainable processes.
- **DL1961** : Sustainable and organic materials, water recycling processes.
- **Mud Jeans :** Closed-loop system, vegan materials, recycling program, denim lease program.
- **Others (non exhaustive list) include:**

ARMEDANGELS , BELLA DAHL, Everlane, E.L.V. DENIM , Frank And Oak, J. Crew and Madewell, JELT, KAPORAL, KUYICHI, ORGANIC BASICS, OUTERKNOWN JEANS, PATAGONIA, PRANARE/DONE, SÉZANE , STELLA MCCARTNEY, Taylor Stitch Organic '68 Denim

Co-funded by the Erasmus+ Programme of the European Union

WINTEX project is co-funded by the Erasmus+ programme of the European Union. The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Towards a new era for jeans production

Despite the number of initiatives steadily improving the environmental and social performance of jeans production, it is clear that more needs to be done. In particular, improvements need to move beyond incremental changes being made by large and high-end players to systemic changes undertaken by players of all sizes and market segments. Such systemic changes need to challenge the predominant business model of jeans production, and to move from an industry producing large volumes of essentially disposable items, to one producing valuable items that remain in use for a long period before being repurposed or recycled.

The consumer behavior is the other aspect to take into consideration. Furthermore, it also requires “buy-in” from consumers for new circular business models, such as jeans subscription-rental models, while re-use, repair/repurposing and recycling models require consumers to return their jeans to stores or collection depots and/or participate in sharing platforms/jeans exchanges. Educating and motivating consumers to play their role in the solution are critical.

Co-funded by the Erasmus+ Programme of the European Union

Conclusion

Many denim companies work to find greener methods and are also making effort to develop new techniques of producing jeans, as a part of their business strategies to protect the environment. They have understood the importance and the need to build a sustainable business.

The denim companies start to have a clear understanding of the practices carried out by the suppliers. Although, the supply chain is spread in different countries but, when they compromise on their ethical and environmental standards, the brand reputation is damaged.

Currently, cotton prices are all time high and there is a rising demand from the customers for jeans. In this tricky situation, manufacturers also need to adhere to the concept of sustainability. Sustainable jeans is not a concept that has been introduced in developed nations only, but also in developing countries like India and China. Indian designers have come up eco-friendly denims for their customers.

Co-funded by the Erasmus+ Programme of the European Union

WINTEX project is co-funded by the Erasmus+ programme of the European Union. The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

The partners

Project Coordinator
UPC - Universitat Politècnica de Catalunya
Spain

CEDECS – TCBL – Consultancy for European Development of Ecological and Social entrepreneurship – Textile and Clothing Business Labs
France

CRNS - Centre de Recherche en Numérique de Sfax
Tunisia

ATCTex - Tunisian Association for Textile Researchers
Tunisia

ISMMM - Higher Institute of Fashion of Monastir
Tunisia

ISET - Higher Institute of Technological Studies of Ksar Hellal
Tunisia

MFCPole - The Pôle de Compétitivité Monastir-El Fejja
Tunisia

UNIWA - University of West Attica
Greece

TUIASI – Gehorghe Asachi University of Iași
Romania

USF - University of Sfax
Tunisia

CIAPE - Centro Italiano per l'Apprendimento Permanente
Italy

AEI TEXTILS - Associació Agrupació d'Empreses Innovadores Tèxtils
Spain

CRE.THI.DEV - Creative Thinking Development
Greece

Co-funded by the Erasmus+ Programme of the European Union

WINTEX project is co-funded by the Erasmus+ programme of the European Union. The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Get in touch

FOR MORE INFORMATION:

www.wintexproject.eu   @wintexprojecteu

Wintex Project   @WintexProject

Co-funded by the Erasmus+ Programme of the European Union

WINTEX project is co-funded by the Erasmus+ programme of the European Union. The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

THANK YOU FOR YOUR ATTENTION