

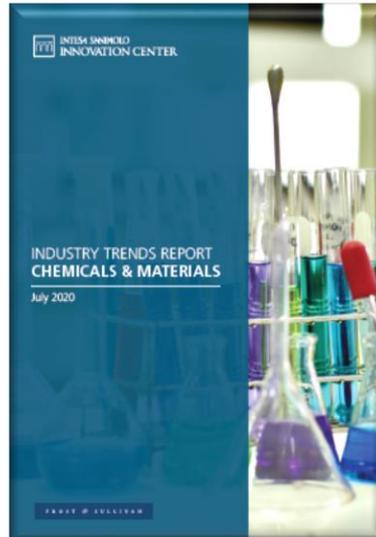
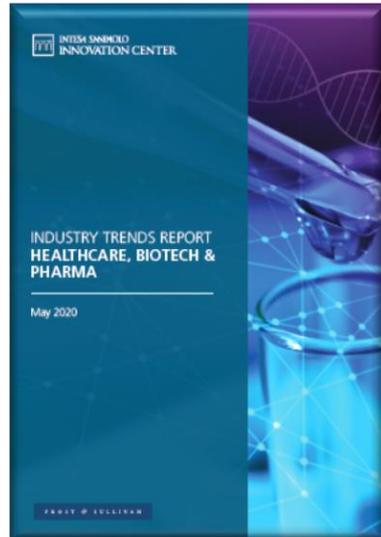
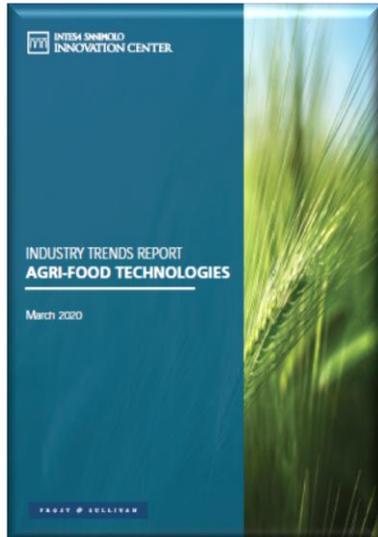


Innovations for a Circular Fashion Supply Chain

Industry Trend Report

Webinar – September 23

Gli Industry Trends Reports 2020



Industrial & Mechanics

Technology, Media & Telco

Automotive, Transportation & Logistics

Environment, Energy & Utilities

3D Industry Trends Reports 2020

Overall, **additive manufacturing** or 3D printing can be broken down into seven major categories as recognised by American Society for Testing and Materials.

▶ **Vat polymerisation** uses a vat of liquid photo polymer resin, out of which the model is constructed layer by layer

▶ **Material jetting** creates objects in a similar method to a two-dimensional ink jet printer. Material is jetted onto a build platform using either a continuous or Drop on Demand (DOD) approach

▶ **Binder jetting** uses two materials; a powder based material and a binder. The binder is usually in liquid form and the build material in powder form. A print head moves horizontally along the x and y axes of the machine and deposits alternating layers of the build material and the binding material

▶ **Fused deposition modelling (FDM)** is a common material extrusion process and is trademarked by the company Stratasys. Material is drawn through a nozzle, where it is heated and is then deposited layer by layer. The nozzle can move horizontally and a platform moves up and down vertically after each new layer is deposited.

▶ **Powder bed fusion** includes the following commonly used printing techniques: Direct metal laser sintering (DMLS), Electron beam melting (EBM), Selective heat sintering (SHS), Selective laser melting (SLM) and Selective laser sintering (SLS)

▶ **Sheet lamination** processes include ultrasonic additive manufacturing (UAM) and laminated object manufacturing (LOM). The Ultrasonic Additive Manufacturing process uses sheets or ribbons of metal, which are bound together using ultrasonic welding.

▶ **Directed energy deposition (DED)** covers a range of terminology. Laser engineered net shaping, direct light fabrication, direct metal deposition, 3D laser cladding. It is a more complex printing process commonly used to repair or add additional material to existing components.



Market & Forecast

Overall, the global market was valued at \$5.1b in 2018 and is expected to reach \$15.1b by 2023 with growth of 24.2% CAGR; Europe accounts for 19.5%.

HEALTHCARE CLOUD COMPUTING MARKET REVENUE FORECAST BY SEGMENT, GLOBAL, 2018-2023



The IaaS segment is expanding the most rapidly but SaaS is the largest contributor.

IaaS will display the highest growth globally from 2018 to 2023, with a CAGR of 25.8%, based on indicators that show many healthcare companies and providers will be converting to this cloud-based environment over the next coming years.

SaaS holds the largest share of sales derived from the cloud in the healthcare sector with 64.9% in 2018. This is because it is easy to see and quantify the benefits associated with choosing the service model over software ownership. SaaS will continue to be the dominant revenue generator overall and the growth segment in emerging markets as providers in these countries do not yet have the capabilities to leverage app ecosystems.

PaaS at 8.5%, accounted for the smallest share of the cloud healthcare market in 2018. These services are more difficult for vendors to position and the pricing model is not as straightforward as for SaaS. PaaS adoption has, however, shown a significant uptick in the last two years and will emerge as a growth segment in developed markets where it provides better control over proprietary and third party custom-built apps.

GLASSOMER

COMPANY OVERVIEW

Industry Segment: Additive manufacturing

Brief Description: Glassomer is a spin-off of the University of Freiburg, Napetalab which successfully 3D print glass, creating nanocomposites called Glassomers, which contain a high proportion of glass powder and a photocurable resin as binder.

Minority: Commercial since 2019

Multimedia: <https://www.youtube.com/watch?v=U8M8FN0t4>

COMPANY STRUCTURE

FOUNDED: 2018

COUNTRY: GERMANY

OF EMPLOYEES: 10

TOTAL FUNDING: N.A.

REVENUES: N.A.

PRODUCT OVERVIEW

Technology Focus:

- Glassomer patent relates to a highly functional nanostructured polymer resin as well as to use as a super-repellent coating of substrates. Furthermore, the patent relates to a composition and to a method for producing the highly functional nanostructured polymer resin.
- The process and the material, invented by Glassomer to fabricate glass like polymer is based on a resin that contains a large amount of glass particles that can be structured by UV light, for instance in the 3D printer with using layer by layer stereolithography printers.
- The material offers liquid and solid Glassomer formulations for classical polymerizing techniques and production services. As a liquid, it can be structured by means of stereolithography or direct light 3D printing. As a solid Glassomer can be structured using classical additive manufacturing techniques like drilling, milling, turning or simply carving with tools.
- A final heat treatment turns the polymer nanocomposites into high-quality transparent lead-free glass via thermal de-binding and sintering.

Main competitive advantage

Fused glass is one of the most important high performance materials, and for applications which require long-term chemical and mechanical stability as well as thermal stability properties. Glassomer's work makes high performance fused glass components accessible to high throughput fabrication technologies and enables new material properties and medical applications in various industries.

Value Proposition

- The company makes personalized structures in glass, so the fabrication also gives parts for prototypes or small series of products.
- Fused glass is highly transparent and resistant to thermal, physical, and chemical impacts. There is a proven prerequisite for use in critical, life-saving or medical engineering.
- Glassomer can be used for printing optical parts, small chips or decorative objects. These objects are made from different fields like optical, photonic, chemistry, medical, jewelry, art and design sectors.

Startups

Key Trends

Freedom foods are foods that are free from unwanted ingredients, substances or other attributes for health, safety, environmental and/or ethical reasons. Their features and characteristics vary but include the minimisation of additives and the avoidance of chemicals as well as the use of renewable feedstocks and free-range livestock.

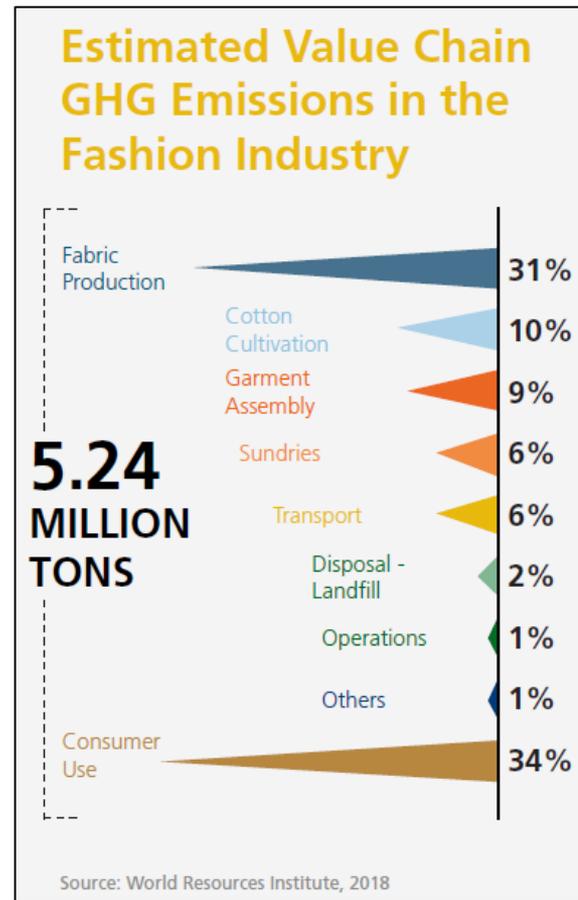


Technology

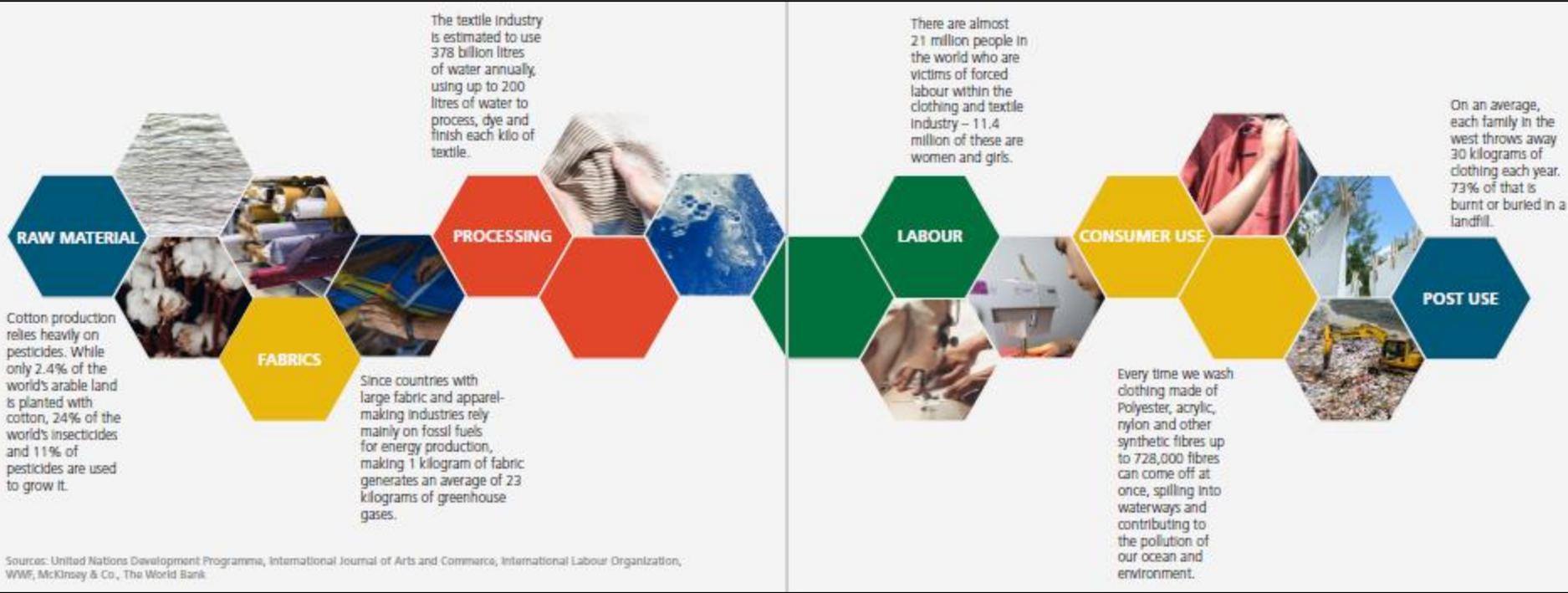
Il contesto – perché un report sulla Circular Fashion

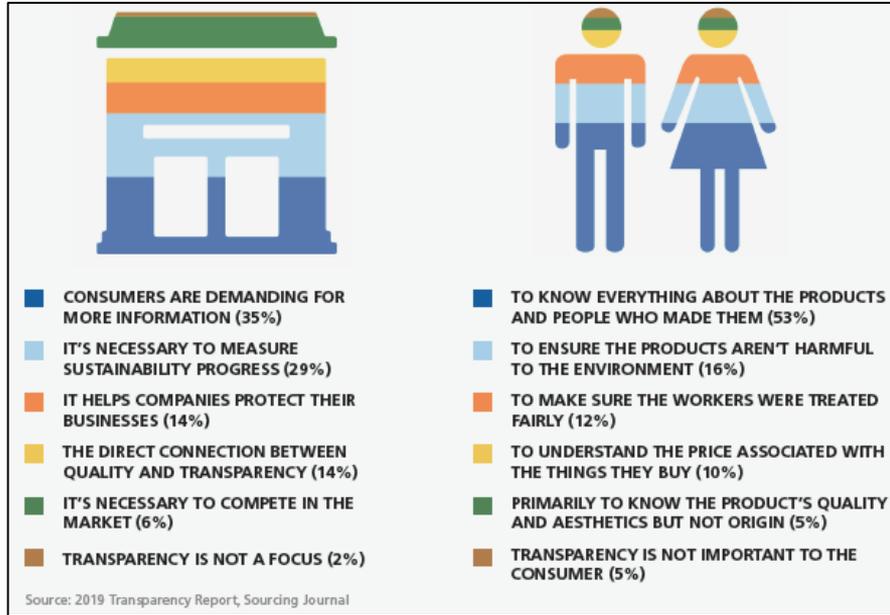
The fashion industry is responsible for 10% of annual global carbon emissions, more than all international flights and maritime shipping combined.

At this pace, the fashion industry's greenhouse gas emissions will surge more than 50% by 2030.



Focus: Ia Supply Chain



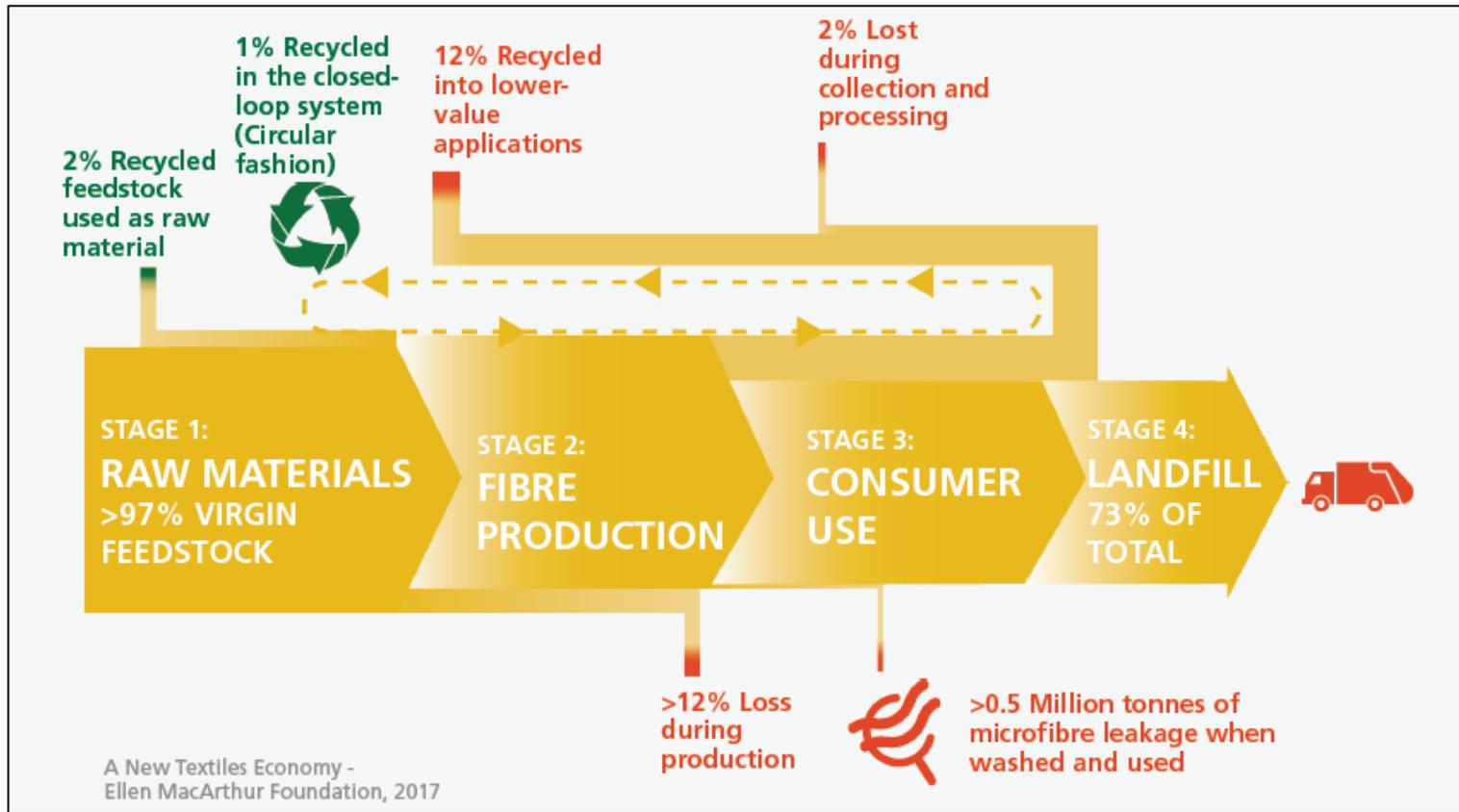


Customers are now very concerned about the environmental implications of fashion. Millennials are the most prominent age demographic that demand transparency from brands. Understanding the production process also helps them see the value of the product and justify the price tag attached to it. Transparency from the brand helps build consumer trust, and thus increases brand loyalty among them.

Industry professionals were asked how confident they were to apply systems for transparency across the levels. Beyond level one, which is the brands themselves, their confidence dipped.



Il punto di partenza: una SC fortemente lineare



A **Circular Fashion** is based on the principles of designing out waste and pollution, keeping products and materials in use, and regenerating natural systems.

Le tecnologie a supporto di una CF



DIGITAL TAGGING

NANOMATERIALS



AUTOMATION AND ROBOTICS

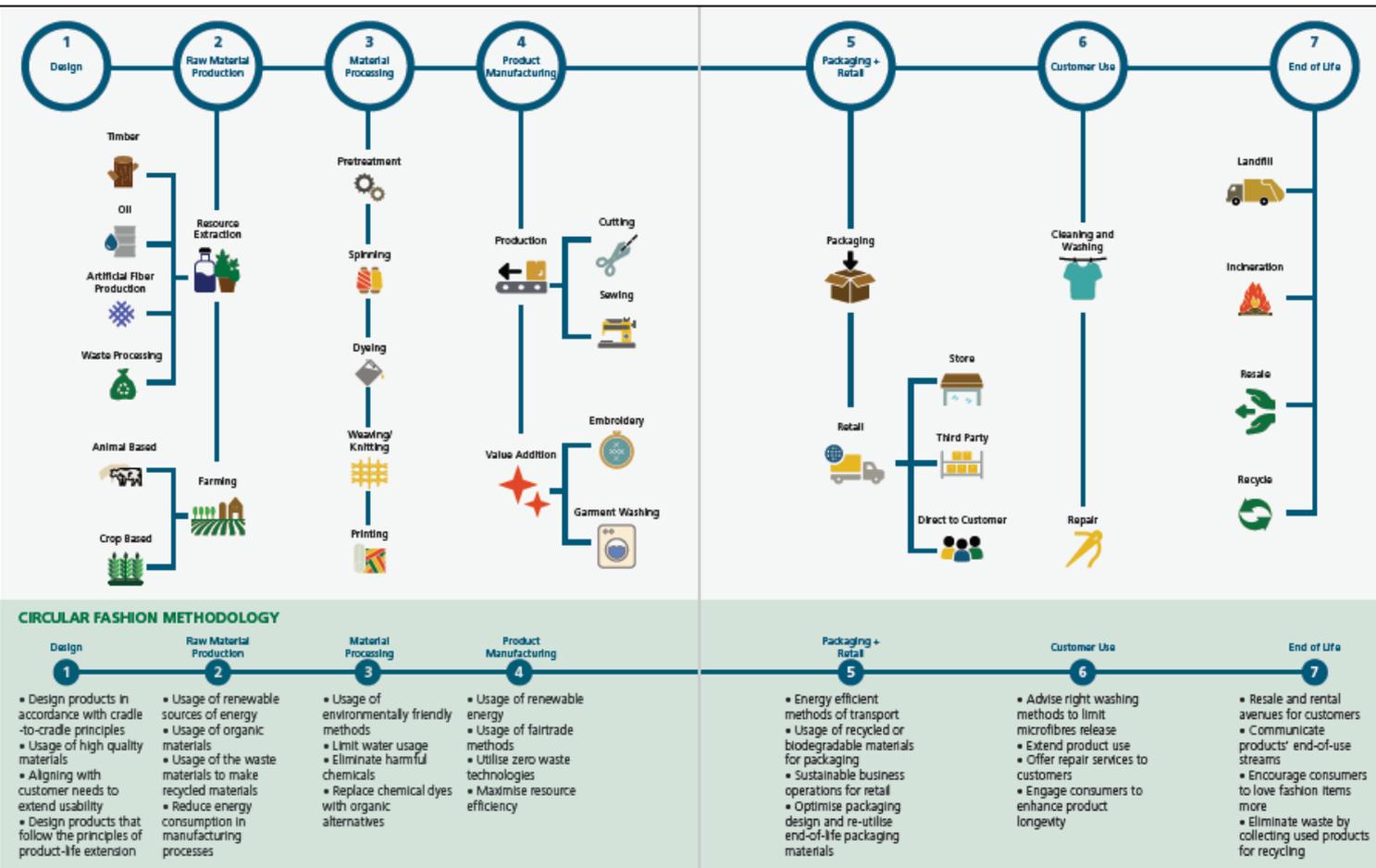
BIO-BASED MATERIALS



CIRCULARITY.ID OPEN DATA & CIRCULARID PROTOCOL

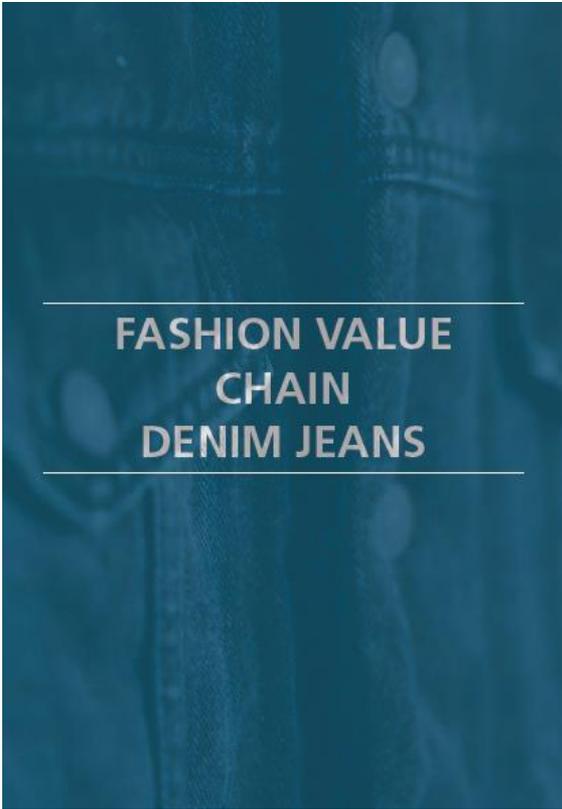


'How To' .. Implementare una Circular Supply Chain



In 2018 the H&M group worked with 1,269 independent suppliers and their 2,383 factories employing about 1.6 million people.

3 esempi analizzati in dettaglio



FASHION VALUE
CHAIN
DENIM JEANS



FASHION VALUE
CHAIN
DRESS



FASHION VALUE
CHAIN
SHOES

Denim Jeans Value Chain

PRODUCT VALUE CHAIN DENIM JEANS



BETTER COTTON INITIATIVE (BCI)

Largely in every brand, denim is made of cotton. Cotton is an extremely water intensive crop. Methods like soil health practices like no-till farming, crop rotation and cover cropping, build crop resilience to weather disruptions while improving yields, reducing water and energy inputs, fighting erosion and reducing greenhouse gas emission.

- 1 Collect the denim waste from Edwin Japan factory
- 2 reclaim the part by recycling in Kurabo spinning factory
- 3 Dye, weave, finish and export the Lookoo fabric
- 4 Product garments using Lookoo fabric

Kurabo's Lookoo garment process.

BOSSA

Bossa is another denim manufacturer, based out of Turkey. Recycling is an important theme for Bossa. The company reuses their own textile production waste by turning them into raw material, and also works with fibres obtained from plastic bottles as part of their r-FET project. Bossa also launched "Denim is Reborn in Bossa", a post-consumer denim recycling (PC20) concept where old jeans are collected, sent to their partner in Gaziantep, Turkey for shredding, and then fibres are remade into fabrics. About 1000 old jeans can be used to produce 2000 metres of 20% rPC20 Blended fabric. Major brands such as Nudie, Zara, Vagabond and Marks & Spencer using fabric from Bossa's concept.

KURABO DENIM

Kurabo Denim is a leading Japanese denim manufacturer. Founded in 1988, Kurabo is one of the few remaining cotton spinning companies in Japan today. The company has come with a range called "Lookoo", a circular fashion based denim. Kurabo is addressing waste with a "Mottainai" approach, using technology and ideas to create from it something new with value, in an effort to contribute to a continuous recycling-oriented society.

During clothing manufacturing, about 15% of fabric becomes cutting waste. In other words, when seven shirts are made, one entire shirt of fabric is discarded. This entire quantity of cut waste is disposed of through incinerated. Lookoo offers reliable traceability in the supply chain of KURABO & EDWIN

In 2019, the company used 70,122 kilograms of post-consumer waste, 85,310 kilograms of post-consumer waste and 2,120,024 kilograms of industrial waste, as per their official sustainability report.

PRODUCT VALUE CHAIN DENIM JEANS



WRANGLER

Wrangler has launched a range of eco-friendly denim products called "Indigo". Denim fabric is dyed with indigo dyes. This process requires a lot of water and energy. Indigo is a new innovative foam dyeing process that uses 100% less water and wastewater is virtually eliminated. Additionally, both energy use and waste are reduced by more than 60% when compared to conventional denim dyeing.



Indigo denim fabric.

In foam dyeing, an indigo foam solution is applied dry to cotton yarn, which dyes it that classic denim blue. The fabric is padded with a foam formed from an aqueous solution of urethane, a foaming agent and a carrier for the dyestuff and the padded fabric is maintained at elevated temperatures to fix the dye.

Where traditional rope dye ranges consume 400 gallons of water per 100 yards of fabric, foam dyeing uses just 3 gallons. Additional benefits of the foam dyeing technology include:

- Gains in commercial operation efficiency
- Reduction in factory footprint
- Improvements in coloration
- Reduction in use of chemicals
- Same or better dye quality than conventional processes
- Superior operational precision, flexibility, and simplicity
- Reduced time required to develop and deliver new denim fabrics
- NET reductions of energy usage of more than 90%.

The yarn is then put in nitrogen to prevent cogeneration, which means the jeans do not need to be soaked multiple times or rinsed through

chemicals. This reduces water consumption, as well as vastly reduces the release of chemicals that contaminate water. It is an energy-conserving alternative to the conventional wet processing, i.e., dyeing, printing and finishing, of textiles.

In addition to using eco-friendly dyeing processes, the Indigo range also uses other circular economy principles. The company reduces wastage and recycles their surplus cotton. Offcuts are shredded and spun into usable yarn. The fabric is made using at least 28% recycled cotton. The labels are made

PRODUCT VALUE CHAIN DENIM JEANS



FRANK AND OAK

The brand is working on implementing the best solutions technology and research can provide.

- They've drastically reduced the percentage of packaging and plastic used for shipping. All of their shipping boxes, including style flats, are made from 100% post-consumer recycled cardboard.
- They discourage the distribution of single-use bags in their stores by providing a purchasable and reusable tote bag option.
- They've joined forces with Earth Day Canada to ensure that 100% of the profits made from their recycled, recyclable, and compostable paper shopping bags go towards planting trees.
- Their receipts rolls are certified by EcoChit, meaning that they are printed on paper originating from sustainably managed forests. For each case of EcoChit used, a tree is planted by the leading non-profit organization One Tree Planted, dedicated to global reforestation.
- They aim to replace the plastic poly mailer bags that ship their items with a 100% compostable version in partnership with Notus.



Notus's Compostable Bags

- Recycled Product Range: made from previously used plastic products, including single use bags, bottles and other common plastic items. The plastic is processed at a recycling facility and put back into circulation, thus doubling its lifespan.
- Reusable Product Range: packaging that has a built-in second (and possibly third, fourth, etc.) use. While most packaging is typically single use, and recycled after it accomplishes its primary goal, reusable packaging can be used multiple times for a variety of functions.

NOISSUE

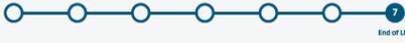
Noissue was founded to provide makers, brands and businesses of all sizes access to custom, sustainable packaging. The company offers three types of packaging:

- Compostable Product Range: typically made from a number of renewable plant-based materials under 180 days. To be certified home compostable, a product must break down in commercial compost within 90 days and be 100% biodegradable.

MUD JEANS

The packaging used by MUD jeans comprises 72% recycled cardboard. No plastic or unnecessary material is included in their packaging. To ensure efficiency in the use of the material, their logistics partner uses a special machine that makes the boxes specific to the size of the jeans that are being sent. When it comes to sustainable packaging, cardboard

PRODUCT VALUE CHAIN DENIM JEANS



BLUE JEANS GO GREEN BY COTTON INCORPORATED

The Blue Jeans Go Green program collects denim made from cotton so that it can be recycled back to its natural fiber state and transformed into something new. Customers can send their worn denim to them by boxing it and shipping them using Zappos for Good.

They also allow volunteers to organize denim drives. Anyone can host a drive to collect denim. Students, professionals, volunteers, and more are excited to collect denim by encouraging and inspiring others in their communities.

It also partners with many brands, few of which are listed below.

Levi Strauss: Levi Strauss & Co. launched a new North American denim recycling initiative in partnership with Cotton Incorporated's Blue Jeans Go Green program. Consumers can bring dry, clean denim clothing from any brand, in any condition, to dedicated bins at Levi's stores in the United States and Canada.

These denim jeans, tops, and jackets will be transformed into insulation for schools, libraries, or low-income housing built by Habitat for Humanity in exchange for recycling their garments; consumers receive a 20% discount off their Levi's purchase.

The effort is a part of L&C's broader commitment to sustainability, which includes their WaterLess technology, the Sowned Chemistry initiative, and a push to source 100% of their cotton through the Better Cotton Initiative.

Industry Standard: The brand participated in Cotton's Blue Jeans Go Green denim recycling program. To give old Industry Standard jeans a second life, customers who have jeans that they would like to trade in, can email them and the brands ships them a prepaid label and gives them \$20 towards a new pair. The jeans they send back will be repurposed into natural cotton fiber insulation and each year a portion is used in building efforts around the country.

Madewell: Customers can stop by one of their stores with their pre-loved pairs from any brand. Partnering with Cotton's Blue Jeans Go Green program they will turn them into housing insulation for communities in need—and give customers \$20 off new ones.

As of May 2020, over 830K pairs of jeans have been recycled since the partnership began.

Rag & Bone: Since 2017 Rag & Bone has been a proud partner of Cotton's Blue Jeans Go Green denim recycling program, bettering the world one pair of jeans at a time. In return the brand offers 20% off customers' denim purchase.

Aritz: The brand partners with Blue Jeans Go Green. Customers who bring their worn denim into Aritz are given a 20% discount off their Levi's purchase.



FRANK AND OAK

Frank and Oak is a leading Canadian fashion brand. The brand has a strong commitment to sustainability and is working to reduce its environmental footprint. The brand is using recycled materials and is committed to using 100% recycled materials in its packaging.

- COLLECT** - The brand has a strong commitment to sustainability and is working to reduce its environmental footprint.
- CUT** - The brand is using recycled materials and is committed to using 100% recycled materials in its packaging.
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Il ruolo chiave del consumatore

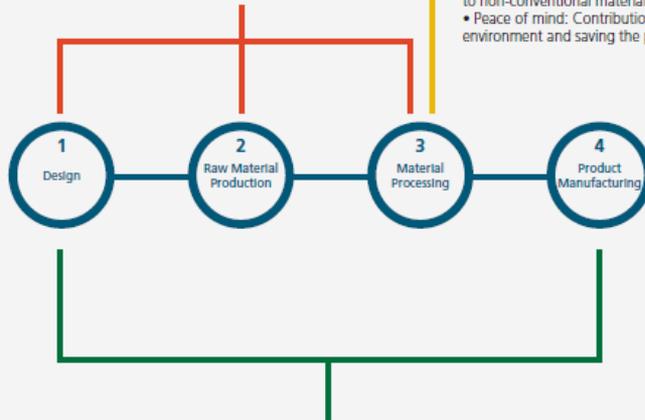
CIRCULAR BUSINESS MODELS IN RELATION TO CONSUMER FASHION VALUES AND FASHION VALUE CHAIN

MATERIAL INNOVATION

- Cool factor: Considered stylish and modern to wear clothes made out of unconventional materials.
- Novelty: Perceived less appealing than something brand new.

RECYCLING MATERIALS

- Sense of responsibility: Clothes made out of recycled or bio-based materials is a good way to contribute to the planet.
- Quality: Uncertainty on quality related to non-conventional materials.
- Peace of mind: Contribution to the environment and saving the planet.

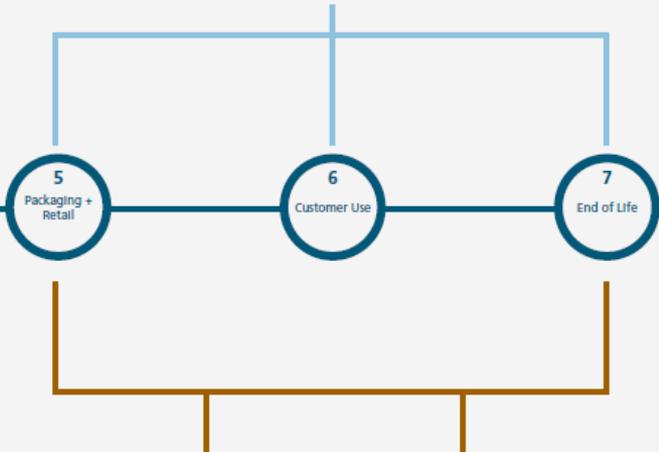


CUSTOMIZATION

- Customizability: Customize, personalize, upgrade, or use as completely new products
- Right fit & style: Perception of being non-modern

SHARING PLATFORMS

- Access variety: Wear the latest trends and clothes best suited for each specific occasion.
- Cost effective: Wear premium clothes at a low cost.
- Trust: Perception that items would not be treated with the same level of good care and hygiene by other users.



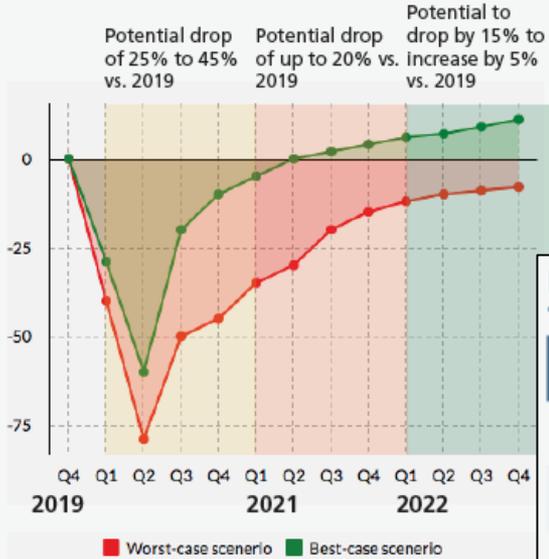
SECONDHAND SHOPPING

- Resources: Responsibility for the planet by enabling clothes to be used for longer periods of time.
- Recover value: Second hand market leveraged to sell used clothes and finance purchase of new products.

TAKE-BACK PROGRAMS

- Resources: Responsibility for the planet by enabling clothes to be used for longer periods of time.
- Recover value: Monetary rewards when returning clothes for recycling.
- Easy access: Perception that ordering, paying, receiving, and returning shared clothes is complex and time-consuming.

LUXURY BRAND SALES COULD TAKE MORE THAN TWO YEARS TO RECOVER



As of 2019, e-commerce accounted for 14% of the total retail sales globally²; which means, retailers relied heavily on brick-and-mortar store sales.

Online fashion orders in Italy increased by 28% between 28th March and 1st April, alongside a 13% increase in revenue for the sector.

PRODUCTS FOR DELIVERY / IN-STORE COLLECTION

% who say they will be more likely to order the following online for home delivery or in-store collection

Countries	All	AU	BR	CA	CN	FR	DE	IN	IR	IT	JP	NZ	PH	SG	ZA	SP	UK	US
Clothes	29	14	29	19	36	15	22	35	19	23	9	18	24	13	26	24	18	17
Cosmetics / beauty products	22	10	27	13	28	12	12	26	10	17	6	13	16	11	20	15	11	11

Segment	Gen Z	Millennials	Gen X	Baby Boomers	Female	Male	Higher Income	Lower Income
Clothes	33	30	27	18	21	28	32	28
Cosmetics / beauty products	23	24	20	12	28	17	27	21

Global, April 2020

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