



Clean and Innovative Textiles Strategy for Circular Economy

MODULE 7

Business and Quality Management

Unit 7.3

Avoid Obsolescence and Overproduction by Reducing Time to Market



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university of
technology



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This lecture is on the ways to avoid obsolescence and overproduction waste in textile production, by focusing on strategies to reduce time to market. It is similar to Just-In-Time manufacturing, a management methodology to control inventory. Just- In- Time requires to produce the right part, in the right quantity, at the right time and place, thus reducing waste in the whole supply chain. It would have been the ideal case for textile waste reduction, but its application is not straight forward and needs to examine and reorganize the total textile supply chain.

The course has the following structure, first some Trends in European Textile Sector will be presented related to waste generation. The course will give emphasis on waste reduction in prototyping and manufacturing, through the implementation of 3D CAD/ Virtual Prototyping and on Demand manufacturing.

Usually when we talk about textile waste, we automatically think about garment waste, as it is the most common type of waste and most statistics are related to clothes production. The fast fashion concept, which to many researchers is the cause for most waste refers directly to garment manufacturing. Most of the available data on waste are towards the final product, the garment.

However, in the 2017 Commission Staff Working Document (SWD) “Sustainable garment value chains through EU development action” separates the activities in the sector and the textile industry refers to the production of yarn, textiles and fabrics, while the clothing (garment/ apparel/ fashion) industry refers to the production of garments. In a broader way the sector also includes other types of textile products, such as household textiles and technical/industrial textiles (for instance, textiles for industrial filters, hygiene products, textiles for the car and medical industry). In addition, the fashion industry can also include shoes, bags, jewelry and other accessories apart from the clothes/ garments.

European textile trends

The European Textile Sector between 1998 and 2009 lost about half its workers and the turnover declined by 28 %, due to the phasing-out of the World Trade Organisation (WTO) textile quotas, which began in the 1990s and ended in 2005. As a consequence, the share of imports in European clothing consumption increased from 33 % in 2004 to 87 % in 2012.

In addition, the supply chain for the production of textiles and clothing is one of the most complex global value chains. Most products on the internal EU market are manufactured outside the EU, but also, according to Euratex, the EU textile and clothing sector exported €48 billion worth of products in 2017, making the EU the second largest exporter in the world. At the same time, the EU imported textile products worth €112 billion from third countries.

Europe has identified the Textile sector as an important sector for circular economy. The implementation of a more circular and sustainable system within the EU needs to go beyond separate collection of textile waste and recycling, as it needs technological innovation and efficient production processes that generate less waste and fewer emissions.

Clothing remains the main source of waste in the textile sector. Several statistics have been published and estimates have been made on the consumption levels.

About 5 % of household expenditure in the EU is spent on clothing and footwear, of which about 80 % is spent on clothes and 20 % on footwear.

In 2015 EU citizens bought 6.4 million tonnes of new clothing (12.66 kg per person) and it shows a constant increase all year and this increase tends to be accelerated. Between 1996 and 2012, the amount of clothes bought per person in the EU increased by 40 %.

The use of cloths also shows a constant decrease, as more than 30 % of clothes in Europeans' wardrobes have not been used for at least a year and most of them are not recycled and they are sent to incinerators or landfill. This is not the case only of the consumers but also of the producers, as many of them have published some data on the stock they possess or the stock they have incinerated.

This consumption is related to the effect of some trends that have decreased the price of garments in the last few decades, such as the fast fashion trend. They are based on the introduction of new styles very often in a short time and at cheap prices, usually using lower quality materials. Fast fashion increased the number of collections released by European apparel companies per year from two in 2000 to five in 2011, while Zara is offering 24 new clothing collections each year, and H&M between 12 and 16.

Changing this fast fashion production model and making it most sustainable goes beyond technological and management changes and it requires a more central administration including the consumer.

TEXTILE WASTE – Facts and Numbers

It is very difficult to use reliable data about textile waste. Here are some facts and numbers from the 2018 Apparel Industry Overproduction Report and Infographic (www.sharecloth.com).

Here are the key facts about production and use:

- 1.7 trillion dollars, is the value of the apparel and footwear market. That's roughly the same as the GDP of Canada.
- 150 billion garments per year are produced in the global fashion industry, which means about 20 items per person.
- 30% of clothes is never sold and another third only leaves the shops with a discount.
- 210 billion dollars makes up an inventory distortion in the global fashion industry. This is the disconnect between what consumers want and what retailers have in stores.
- 460 billion dollars is how much the global economy misses out on each year because people are throwing away clothes they could continue to wear.
- An average American buys 70 apparel items a year. That is a new piece of clothing every four to five days.
- The average closet of a UK citizen contains 152 items. More than half gather dust. There are \$45 billions of unworn clothes in the United Kingdom alone.
- Less than three years is the lifetime of an apparel item in developed countries.
- More than 50% of fast fashion produced is disposed in under one year.

And some of the consequences

- 12.8 million tons of clothing is sent to landfills annually
- 92 million tons of solid waste each year, is produced by the fashion industry using 98 million tons of natural resources.
- 1.2 billion tons annually, is the total greenhouse gas emissions from textile production. This is more than those of all international flights and maritime shipping combined.
- 7,000 litres of water is needed to produce one pair of jeans. An average person drinks that much in about six years. The industry produces 2 billion pairs of jeans every year.
- 102 million tons, will reach the global apparel production in 2030 if the population and economy rise as expected. It has doubled in the past 15 years and now makes up 62 million tons.

Types of textile waste

Waste is generated in the whole production supply chain from the agriculture for natural fibers up to the consumer with the final product and also within the process for executing each step.

It has been reported that H&M in 2018 was sitting on a huge pile of unsold clothes — \$4.3 billion worth of inventory and most of them are directed to a power plant in a Swedish town Vasteras to create energy. It incinerated 15 tons in 2017. Also, the luxury brand Burberry admitted burning products worth \$37 million instead of selling it at a lower cost.

Three types of wastes can be distinguished,

- Finished Goods, Unsold Cloths and Old Cloths, as reported above
- Raw Materials, often called Deadstock.
- Design waste, from the existing product development process.
There are many reasons for the generation of the waste, especially for the Finished goods and the raw materials, which mainly are due to the existing consumption profile of the users. This profile is encouraged by a number of factors stemming from the producers.
- Consumers show a growing demand for clothing. It is not due only to the increased Earth's population, but the shopping urge has taken on a quasi-addictive quality. It starts from the fashion bloggers and Instagram celebrities, who always are seen with a different outfit and this trend is implied to the rest of the consumers.
- The fast fashion system distorts our sense of value. Low-price and low-quality clothes have also low value to customers and are considered disposable. Customers are not by somehow connected with the cloths they own and they consider them as always been disposable.
- There is a forecasting error, which is again market driven. Companies alleviate any risk by the low production costs and they prefer to overproduce than to underestimate the demand.
- Fashion span is limited as Fast Fashion bring new items in the market very fast, as it was mentioned previously.
- The unit cost of the cloths is bound with the quantity of the order. The bigger the order, the smaller the price per item and for fast fashion, it is often crucial. The industry typically places high-volume orders well in advance, which usually exceeds actual demand. The consequence: large quantities of clothing are heavily discounted shoppers anticipate those markdowns and this leads to over consumption and over dumping.

TEXTILE WASTE - Waste Reduction of Finished Goods

Many approaches have been proposed to reduce waste of the final products, the cloths. The list is not exhaustive and there are several variations between them. None of them can work independently and some of them can be combined. Some of these approaches are:

- On Demand production, which is the fast-turn, small batch production local to the end consumer.
- Zero Waste Design, which “refers to items of clothing that generate little or no textile waste in their production. It can be considered to be a part of the broader Sustainable fashion movement. It can be divided into two general approaches. Pre-consumer zero-waste fashion eliminates waste during manufacture. Post-consumer zero-waste fashion generates clothing from post-consumer garments such as second-hand clothing, eliminating waste at what would normally be the end of the product use life of a garment”, (Wikipedia)
- Redefine Progress and Sustainability. “Less unsustainable is not sustainable. Patagonia no longer uses the term sustainability. The fashion companies should not be allowed to simultaneously profess their commitment to sustainability, while opposing regulatory proposals that deliver the same end”.(HBR 2022)
- Rewrite the regulations. Government rule makers must price negative externalities, including

extended producer responsibility (EPR) legislation, force fashion brands to share and abide by supply-chain commitments, etc.

On demand production

This is an adaptation of the Just In Time approach suitable for one-off customized item or a rule-based batch order. As mentioned before, On-Demand production model is based on existing orders and goods are only made when they are required. In the fashion industry it is an old model also called made-to-order. Its use became more apparent during the recent pandemic. It implies longer waiting time for the customer, as the product has not yet been made by the manufacturer at the point of order.

It is an agile process, as it is able to capture the latest fashion trends, it needs no special inventory, when well-planned can offer increased Customer satisfaction, it can lead to better relationships within the supply chain and as an end result it present less environmental issues.

On Demand Production is supported by the major vendors of CAD/CAM systems for the fashion industry. It can only operate through extensive use of digital tools, and it is offered as a service by several vendors. It requires a well technology, that can cover all actors in the supply chain.

It is better implemented when combined with a number of approaches, such as Zero waste design, improved material planning, investment in local production, and as it was mentioned it is a technology- based approach making full use of digital fashion.

Sustainable apparel design model

Another approach that also reduces the time to develop a product is the use of Virtual Prototyping in the design stage of a product. As a technology is available since many years but its adoption in the fashion sector is limited, compared to its use in more advanced sectors, where it is a must tool to have. It changes the lengthy, time consuming traditional design phase of a garment, which is based on 2D sketches, and uses the classical product development cycle, from preparation of the cut pattern and modifications, to sewing prototypes, and innumerable iterations with many samples traveling back and forth between the factory and the customer. It is lengthy, generates a lot of waste and it is environmentally harmful.

The use of digital assets and tools, reduces the physical sampling costs, increases speed-to- market, reduces product development lead-time, leverages Voice of Consumer (VOC), Improves sustainability (not only on samples), and it is a necessary tool for On Demand Production.

On the left diagram the two development cycles are shown.

Conclusions – end notes

- Despite the global awareness of fashion industry contribution to environmental pollution the industry continues to grow.
- Complex supply chain and each step has its own contribution to environment
- Current fashion-consumption practices are harmful to environment

All stakeholders need to be motivated on:

- Policy makers
- Redefine business models
- Train the consumers

USED AND INTERESTING REFERENCES

- Niinimäki, K., Peters, G., Dahlbo, H., Perry, P., Rissanen, T., & Gwilt, A. (2020). The environmental price of fast fashion. *Nature Reviews Earth & Environment*, 1(4), 189–200. doi:10.1038/s43017-020-0039-9
- Muthu, W.W. (2019), *Circular Economy in Textiles and Apparel. Processing, Manufacturing and Design*, Woodhead Publishing, UK
- Pucker, K. (2022), *The Myth of Sustainable Fashion*, HPR Ja. 2022, <https://hbr.org/2022/01/the-myth-of-sustainable-fashion>
- Style that's sustainable: A new fast-fashion formula, <https://www.mckinsey.com/business-functions/sustainability/our-insights/style-thats-sustainable-a-new-fast-fashion-formula>
- The 2018 Apparel Industry Overproduction Report and Infographic by ShareCloth, <https://sharecloth.com/pages/vision/industry.php>
- Environmental impact of the textile and clothing industry What consumers need to know, [https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI\(2019\)633143](https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2019)633143)
- Progress towards preventing waste in Europe — the case of textile waste prevention, <https://www.eea.europa.eu/publications/progressing-towards-waste-prevention-in>
- Nicole Barrientos-Ramos, Luz Tapia-Cayetano, Fernando Maradiegue-Tuesta and Carlos Raymundo, *Lean Manufacturing Model of Waste Reduction Using Standardized Work to Reduce the Defect Rate in Textile MSEs*, 18th LACCEI International Multi-Conference for Engineering, Education, and Technology, <http://dx.doi.org/10.18687/LACCEI2020.1.1.356>
- Why Every Fashion Brand Should Start Thinking About Zero-Waste Design, <https://eco-age.com/resources/every-fashion-brand-should-start-thinking-about-zero-waste-design>
- On-Demand Fashion, <https://platforme.ac-page.com/ondemand-fashion-the-ultimate-guide>
- WASTE IN FASHION AUTUMN 2019, <https://www.sonofatailor.com/behindtheseams/>
- Papahristou, E., & Bilalis, N. (2017). Should the fashion industry confront the sustainability challenge with 3D prototyping technology. *International Journal of Sustainable Engineering*, 10, 207 - 214