



[Technology trends in the apparel industry](#)

The apparel industry is facing great changes. Technology trends offer interesting opportunities, if you know how to use them to improve your business. Big data, combined with production automation and product technology innovation, has the potential to make manufacturing more precise, as well as more local and sustainable. Potential benefits include higher speed, faster delivery times and lower cost than currently, as a result of reduced shipping times and lower stocks.

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1 . Big data

Big data refers to data sets so large that they can be difficult to manage using traditional data processing applications. These big data sets can generate business intelligence beyond unlocking hidden savings and fine-tuning production processes. By collecting the right data, [businesses cannot only improve their economic development, but also their environmental and social performance.](#)

The patterns and correlations that big data analytics reveal can benefit almost any industry, but in the supply chain big data is particularly interesting for the manufacturing industry. The information it generates can be used to make decisions, improve productivity and develop innovations.

Three promising ways in which big data can benefit the apparel industry are analysed below.

Big data for Corporate Social Responsibility (CSR)

Big data can help the apparel industry solve one of its main problems: unsold inventory. In March 2018, [H&M reportedly had close to €3.8 billion worth of unsold clothes](#), mainly due to poor inventory management. When apparel is sourced through multiple supply chains, with multiple vendors in a non-standardised industry, this can create huge inventory and logistical problems that cost money and lead to an unnecessary waste of resources.

When you understand the entire process, from development to waste management, you are able to predict what products are actually needed to prevent overproduction and you can ship them when needed, reducing emissions from transportation. By making the supply chain more efficient, you

are making it greener and more socially responsible. Other benefits of a more efficient supply chain include lower costs, reduced stock and a shorter time to market.

Big data applications for CSR may include:

- up-to-date capacity planning;
- predictive capacity planning;
- predictive garment manufacturing;
- predictive fabric manufacturing;
- more control over supply and demand;
- rating the CSR-performance of a company.

Big data for growth

The right big data can be a great way to understand your customers' behaviour. It can also provide insights into [sales prospecting](#), business needs and product sales.

To keep production costs low, apparel companies can gather and analyse data to ensure they create clothes that their customers want to buy. Using customer buying habits data along with artificial intelligence and machine learning, companies are able to better predict styles and products that will sell in their target markets. This means they can leverage low-cost final inventory purchases to keep pricing so low that customers are more easily tempted to buy on impulse and buy more often.

Collecting data has become more common, especially among big fashion multinationals. Various types of resources to collect and manage valuable data already exist, such as [Enterprise Resource Planning](#) software and online analytics. Nonetheless, many fashion companies do not yet fully understand the potential of big data nor know how to use it to help their businesses grow.

Internet giant Amazon, for instance, is gaining ground in the fashion industry. This is an interesting development, since Amazon is not primarily driven by fashion knowledge, but by data and technology expertise. Amazon has a patented factory model for on-demand manufacturing of personalised garments with next-day delivery. This technology seems to be a good example of an application for big data in the apparel industry, combining predictive consumer behaviour monitoring with make-what-you-sell production and up-to-the-minute distribution.

Using big data for growth essentially means optimising your supply chain and unlocking your potential growth areas.

Big data insights can help your company grow in many ways, including:

- finding new leads;
- generating repeat sales;
- increasing conversion rates;
- predicting future sales;
- reducing costs by optimising your supply chain;
- communication — Enterprise Resource Planning software;
- predictive selling, meaning shoppers receive products based on software predictions of their needs and wants.

Big data for online shopping and direct-to-consumer (D2C) sales

Direct sales can offer great opportunities in the global apparel market, where [they are becoming a key retail channel](#). Not only do direct-to-consumer (DTC) sales allow companies to forge direct relationships with consumers, they also open up an opportunity to collect big data from those consumers. The intelligence this big data generates, in turn, enables businesses to improve their performance. This leads many large companies to invest in D2C sales. For example, [Nike announced plans to expand its D2C sales by 250% by 2020](#).

Online sales platforms such as [AliExpress](#), [Alibaba](#), [Amazon](#) and [eBay](#) have been encouraging consumers to buy directly from factories in Asia, making it easy and cheap for both buyers and sellers. Alibaba, for instance, [has recently announced a new warehouse in Belgium](#) set to begin

operating in 2021. These developments are all expected to boost D2C sales.

Big data benefits of online shopping and D2C sales include:

- speed to market;
- better customer relationship management;
- better browser experience;
- personalised shopping experience;
- [unified commerce](#) and [omnichannel](#) strategies.

Many apparel producers from developing countries currently have limited or no access to valuable data. Often, the only available data are those shared by buyers. As you learn to use big data, you may become less dependent on intermediaries and gain more control over your own supply and demand.

Tips:

- For more information on the potential of big data in the apparel industry, see for example [From Big Data to Big Insights: How the Apparel Industry Can Benefit from Artificial Intelligence](#).
- If feasible, include data analysis in your strategy. Keeping in step with developments, for example, by teaming up with a local tech company or data consultancy firm, can create opportunities. It is important to be aware of how tech developments are changing the industry.
- Look into other innovative business models that have emerged in the apparel industry. Some of these include subscription-based services such as [Stitch Fix](#), sharing economy start-ups such as [Villageluxe](#) and peer-to-peer resale platforms such as [Grailed](#).

2 . Blockchain technology

Blockchain is a modern mix of existing technologies used to record transactional information, originally created for cryptocurrency transactions.

Traditionally, a record of all transactions is kept in a central location such as a bank for financial transactions. Blockchain, however, records them in a distributed ledger. It links transactions or blocks in an encrypted ledger or chain, stored on many computers in a peer-to-peer network. The larger the network, the more difficult to corrupt.

Blockchain technology has the unique ability of creating a physical-digital link between goods and their digital identities on a blockchain. This kind of link opens opportunities for a more transparent supply chain. With blockchain, you can create a digital history of information or an audit chain of the total value chain, with timestamps, for each product. Since this data is immutable, meaning it cannot be modified unilaterally, blockchain places an extra layer of security to validate the information companies provide about their products and processes.

How can blockchain benefit the apparel industry?

The use of blockchain technology is already changing the apparel industry, offering new ways of implementing transparency in a supply chain. Using blockchain, a chip or a tag added to a product can be used to store all the relevant data about that product, including:

- which farm supplied the cotton;
- who made the yarn;
- what was used to dye it;

- who manufactured the product;
- how it was shipped;
- what costs were involved in each step.

All of these 'blocks' of data can be stored on that product's tag, which can then be accessed and verified by any number of computer users participating in the chain.

When the origin of a certain material is added to the database at the moment of use, for example, this data is secured at that very moment with blockchain technology. The data can then be stored and read with the use of chips, tags and scanning, using for example [quick response \(QR\) codes](#). Later in the life of the product, during production, distribution, sale and even disposal, nobody can change the information without making it visible that it was tampered.

Future applications of block chain technology in the apparel industry include:

- preventing the sale of counterfeit goods;
- preventing 'double spending' of certifications, for example, of organic cotton;
- replacing letters of credit;
- use of [cryptocurrencies](#), which can offer alternative forms of funding and payments for small businesses;
- Radio frequency identification (RFID) tags on garments and inventory for instant traceability, improved inventory management and automated recycling.

General Data Protection Regulation

Europe's new [General Data Protection Regulation](#) (GDPR) came into effect on 25 May 2018. This regulation is designed to protect individuals in Europe from privacy and data breaches.

The main appeal of blockchain as a new technology is the fact that data cannot be altered in a blockchain, but it also poses a challenge for its adoption in the European market. The new GDPR gives individuals in Europe the 'right to be forgotten', meaning they are entitled to have their personal data erased. That requirement alone is obviously incompatible with blockchain technology and a key problem for its adoption in the European market.

Tips:

- Familiarise yourself with blockchain technology as a means of reshaping your supply chain and reaching new transparency levels.
- Read about [what blockchain can do for the fashion industry](#), as well as [applications for blockchain in the fashion industry](#).
- For an example of blockchain use in the fashion industry, look at [Provenance](#).
- Do not store personal consumer data in a blockchain.
- Stay informed about the latest news regarding GDPR and blockchain technology.

3 . Technology for manufacturing

New manufacturing technologies enable the apparel industry to move from labour-intensive production to capital-intensive production. Other outcomes of new manufacturing technology include faster production, less waste, reshoring and localisation of production nearer to market and lower carbon footprints.

Although these outcomes are generally positive, localisation of production can potentially lead to job losses in developing countries which produce apparel for the European market.

New manufacturing technology solutions include:

- innovations to sewing machines, such as laser-cutting machines, fusing machines, button hole machines, and seam bonding machines;
- sewing robots;
- stitch-free clothing;
- 3D printing, which has more potential for apparel production than current applications, especially for garments involving multiple layers;
- digital textile printing, which gives companies and consumers the ability to customise and produce specific consumers' designs and ideas quickly and relatively cheap.

Tips:

- If you are facing the challenge of losing business as a result of localisation, you can counter this by tapping into your own local market. This will also increase the circularity and sustainability of your economy.
- Focus and transform your workflow before investing in expensive machines, which leads to the best return on investment.
- Invest in education and know-how in garments and technologies.
- Collaborate and form cooperatives, for example, when using new technologies and expensive machinery.
- See our study on [3D design and print](#) to learn more about opportunities of using these technologies in the European apparel market.

4 . Design technology

Many current developments in apparel design technology can help you design and sell your product. European buyers may expect you to deliver more digital data and presentation material along with your product. As a supplier, you are expected to shift from being a contractor or sub-contractor to become a partner.

3D design

Designing a new garment style includes finding the best fit. For example, should it have a looser or tighter fit, long or short sleeves, and a pointed or curved collar? This process can be significantly improved by 3D rendering. Flat sketches and technical patterns can be morphed into simulated 3D renderings, allowing you to adjust the design and create the best fit in real time.

Artificial Intelligence (AI) in fashion design

An interesting example of using AI in the apparel industry is [Project Muze](#), a project by Google and Zalando. The project trained a neural network to understand colours, textures, style preferences and other aesthetic parameters derived from Google's Fashion Trends Report as well as design and trend data sourced by Zalando. The project used an algorithm to create designs based on users' interests, aligned to the style preferences recognised by the network.

Ultimately, [the fashion pieces created through Project Muze were not entirely successful](#), but the possibilities of using AI in the apparel industry are still in development and show promising progress.

Some of the examples that product development technology can provide include digital showrooms and virtual design.

Tips:

- Look into available design technology options to decide which can benefit your business.
- Read more on [innovations in the clothing industry](#).
- See our study on [3D design and print](#) to learn more about opportunities of using these technologies in the European apparel market.

5 . Technology for sustainability

The apparel industry [accounts to 10% of global carbon emissions](#). More sustainable apparel production can therefore significantly contribute to more sustainable economies. When it comes to improving sustainability in the apparel sector, data science and recycling technologies have the strongest potentials.

Many technologies are already available to make the garment supply chain more sustainable. However, most promising technologies require extensive effort, money and collaboration to produce actual tangible results. Having the right people, in the right places, making the right decisions, remains one of the main challenges for companies that are ready to take up the cause of sustainability.

Interest in cleaner technologies is quite high but scaling up such technologies takes a lot of time and money. As discussed below, the move towards sustainability must come from producers, governments and consumers.

Producers

European apparel companies are looking for materials, fibres and techniques that are sustainable and functional. These materials can be natural or synthetic, as well as renewable or recycled.

The biggest change in sustainability for the apparel industry might come from shifting to a [circular or closed loop supply chain](#), involving a recycling model where unused or discarded items are fed back into the chain to minimise waste. To achieve that, producers have to change the way garments are designed and produced, shipped, bought, used and recycled.

Innovation may help stimulate the start of the shift to a circular economy. For example, sustainable man-made alternatives in the form of lyocells such as [Tencel](#), [Modal Micro](#) and [Ecovero](#) provide closed loop systems that reuse water and chemicals to manufacture yarns.

Other examples of recycling and waste use in manufacturing include:

- vegan leather, made of wine leftovers;
- garment waste as a resource, such as recycled yarns;
- food waste-to-yarn solutions;
- electrospinning of recycled materials.

[Global food waste is estimated at 1.3 billion tons per year](#). Food waste combined with the excessive amount of garments and textiles waste have given rise to a new sustainable solution: the use of food and agricultural waste to create new materials. Waste from citrus peels, milk, pineapples and coffee grounds are already being used to produce new materials for the apparel industry.

Other innovations that contribute to a more sustainable supply chain include:

- [ozone finishing](#), which substantially reduces the use of water, energy, chemicals, enzymes and stones, using the natural bleaching capabilities of ozone gas for overall and specialty bleach effects;

- [Spray-on fabric](#);
- low-impact fabrics;
- chrome-free tanning of leather;
- water-free and chemical-free dyeing solutions for synthetics;
- [fungus-based materials](#) grown from mycelium and other agricultural by-products offer a sustainable alternative to leather, plastic foams and other materials that have poor environmental performance;
- big data solutions can also improve the sustainability of the apparel supply chain.

Governments

Consumers and businesses need clearer definitions to be able to rank products and brands and compare how they perform on sustainability criteria. Introducing a recycling grading scheme, for example, would help shoppers determine the sustainable performance of a product.

Local and regional initiatives such as [Rank a Brand](#) already exist, but the introduction of a global recycling grading scheme can be a major step towards making the apparel industry more sustainable. Traceability is key in the development of such a grading scheme. New technologies such as big data and blockchain would make implementation of a transparent sustainable grading scheme easier. Nonetheless, any such effort would still require commitment from industry and governments worldwide.

Consumers

European consumers have been demanding more sustainable apparel. They increasingly understand that they are voting with their wallets. Social media is a big driver of this trend, giving consumers a platform to show what they think is important, while amplifying the effects of reviews and opinions shared online.

As an apparel producer, you can use communication and storytelling to improve your image and your product's sustainability record. Good, well-grounded storytelling can boost more conscious buying behaviour. Consider collaborating with social influencers to promote your product.

Using crowdfunding platforms such as [Kickstarter](#) may help not only to raise money, but also to get consumer feedback on your designs. Getting early consumer input and cash can be decisive for a new business, especially in fashion, where there are a lot of upfront costs before making the first sales.

Tips:

- Check the annual [Global Change Award](#) of the H&M Foundation for more examples of sustainable initiatives in the apparel sector.
- Read Accenture's [Circular Fashion Tech Trend Report](#) for more information on how technology can benefit the sustainability of the apparel industry.
- Read more on circular fashion, for example, [this article on WT VOX about using biotechnology to achieve circular fashion](#).
- See the [Food and Fibers Project](#) for more information about how food waste is used in fashion, including examples.
- If you are interested in the possibilities of crowdfunding, check [this list of top crowdfunding fashion sites](#) and [crowdfunding platforms](#).

6 . Wearable Technology

Wearable technology is a category of devices that can be worn on the body, either as an accessory or as a part of the material used in clothing. [The global wearables market grew by 10% from 2016 to 2017](#), reaching 115 million units. Although growth rates have come down from the 2015-2016 figures, this is not due to a slowing interest in wearables, but rather a result of a maturing market. Growth percentages are expected to remain in the double digits in the next three years.

Developments in underlying computing technology means computers can now be so small that they can be integrated in clothing, complete with sensors and a battery. This presents more opportunities for the development of smart clothes. Some analysts even argue that [smart clothes, not smart watches are the future](#). This type of [smart apparel can collect data](#), for example, to track wellness or fitness metrics and provide the user with direct feedback.

In a [2018 survey by WT VOX](#), fashion buyers were asked about their impressions on wearable technology in fashion apparel and accessories. Among the consumers surveyed:

- 16% feel more fashionable wearing fashion apparel with embedded technology;
- 15% believe that any wearable technology can make them look more attractive;
- 24% think that showcasing wearable technology infused apparel makes them appear more intelligent or successful;
- 32% believe that most available wearable technology products have poor and unappealing designs.

These results illustrate the market potential of wearable apparel and the need for good and attractive designs.

Examples of current wearable technology devices include:

- fitness-tracking bands, such as those from Fitbit, Runtastic, Mio, Misfit, Nike, Microsoft and Garmin;
- [smart sports bras](#);
- smartwatches, including the Apple Watch and those running on Wear OS;
- smart glasses such as Google Glass and Sony's SmartEyeGlass;
- [wearables for pets](#);
- outerwear such as jackets with built-in LEDs.

Examples of technology used in wearables include:

- Radio Frequency Identification (RFID) — In a digital dressing room, sensors can read RFID tags or threads in the clothing items that the customer is trying on, while connecting with a smart mirror. The consumer is then able to browse options, request different sizes and even order matching items from inside the dressing room. This ensures the consumer gets the correct size and helps make well-informed purchases;
- rechargeable batteries and built-in solar cells can make wearables a mobile power source for portable devices;
- Near-Field Communication Technology — This wearable technology allows consumers to interact with their clothing and receive information about the garment, including materials used, cost and manufacturer. A near-field communication (NFC) chip can personify each garment with any desired information;
- [Bluetooth Low Energy](#) allows wearable devices to communicate with smartphones while using much less battery power than previous Bluetooth technology.

Tips:

- Look into the annual [Wearable Tech Awards](#) list for inspiration from the newest developments in wearable technology.
- When designing apparel with wearable technology, focus not only on the design of the

technology, but also on the design of the apparel.

- If you are interested in wearable technology for education purposes, read for example [this article on WT VOX about the future of wearable tech for education](#).

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