



WHITE PAPER

SUSTAINABLE FASHION:
WHAT STRATEGIES
AND TECHNOLOGIES?

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Part 1

WHAT'S THE STATUS OF SUSTAINABLE FASHION?

Sustainable fashion, (also called ethical or eco-friendly fashion), once on the fringes of the mainstream, is gradually making its mark on production and consumption habits. Well aware of the harmful effects of the textile industry on the planet and human rights, industry players are turning to **less polluting and more eco-friendly options**.

According to a January 2024 report from Business Research Company,¹ a market research and business intelligence firm, the size of the global market for responsible fashion, which represents about 4.5% of the global industry, was expected to grow from **7.57 billion dollars (7.12 billion euros) in 2022 to 8.17 billion dollars (7.68 billion euros) in 2023, with an annual growth rate of 8%**. Between now and 2027, the global ethical fashion market is expected to reach 11.12 billion dollars, or 10.45 billion euros.

We are witnessing a new awareness. The damaging effects of this industry on the environment can no longer be ignored. Overproduction—dubbed a “disaster” by Marina Spadafora, an Italian sustainable fashion consultant—could even be its banner, as it encapsulates all the tensions and demands felt by sustainable fashion players. Worldwide, **100 billion garments are sold every year**.

Global garment production doubled in just fourteen years, between 2000 and 2014, while product lifespan has fallen by a third.

Such overproduction is accompanied by significant pollution: the emissions generated by the textile industry worldwide—from raw materials production, manufacturing, transport and marketing—amount to **4 billion tons of CO₂ equivalent**. “This is more than the impact of international flights and maritime traffic combined,” says the French Agency for Ecological Transition (Ademe).² In 2050, the textile industry is expected to emit 26% of global greenhouse gases (GHG) if current consumption trends continue, according to Ademe.

While the increased awareness is real, transforming the textile industry to meet environmental and social challenges is nonetheless a delicate task. Between profitability, greenwashing, transparency, the legislative framework, etc., players in sustainable fashion face many challenges.

Between now and 2027, the world market for ethical fashion is expected to reach

\$11.12B
(€10.45B)

¹ [thebusinessresearchcompany.com](https://www.thebusinessresearchcompany.com)
² multimedia.ademe.fr



What are the challenges for fashion brands?

→ Social and environmental challenges

"The textile industry, facing a major environmental and human crisis, will have no choice but to change as certain planetary limits are exceeded," says Kate Fletcher, Professor at the Royal Danish Academy: Architecture, Design, Conservation and at the OsloMet in Norway.

The fashion sector is currently undergoing **profound change**. "Brands now have to be highly transparent in their communications with consumers. They also need to accurately measure their impact in order to lessen it using eco-design, and finally, to streamline their logistics, resulting in less stock and fewer unsold items," states Adeline Dargent, General Delegate to the Paris Women's Fashion Union, who supports companies dealing with regulatory and environmental responsibility issues.

With regard to communications challenges, the absence of an official and scientific definition of sustainable fashion seriously complicates the role of companies that must sensitize customers and face the giants of fast fashion or ultra fast-fashion and their marketing operations that are often called out for **greenwashing**. In the United States in 2022, complaints emerged against large groups for misleading business practices,³ while in April of 2024 certain brands were accused by the British NGO, Earthside, of being "linked" to large-scale deforestation activities in Brazil.⁴ In Europe and in the United States in particular, more and more laws are being passed to take a stand against the excesses of fast fashion and ultra fast-fashion.



"The textile industry, facing a major environmental and human crisis, will have no choice but to change as certain planetary limits are exceeded. "

Kate Fletcher
Professor at the
Royal Danish Academy

³classaction.org

⁴earthside.org.uk

The other significant challenge emphasized by Adeline Dargent is concerned with measuring their impact. Measuring impact requires a perfect understanding of the production chain, which in turn calls for close collaboration among all players involved. Technology—which we will look at in the third part of this white paper—can play a key role.

→ Economic challenges

Aside from sustainability challenges, companies in this sector also face profitability challenges. "While fashion brands have always sought growth and greater profit, geopolitical uncertainties are multiplying at an unprecedented pace. Previously, brands had a certain visibility over several months and maintained a certain calm, but today that is no longer the case," says Maximilien Abadie, Chief Strategy Officer and Chief Product Officer for the Lectra Group. The war in Ukraine, the energy crisis and inflation—over 10% cumulatively over the last two years in France; 2.6% year-on-year

in May in the Eurozone and 3.3% year-on-year in June 2024 in the United States—have put a strain on fashion companies. In 2023, 30% of textile companies recorded **downturns in activity of between 0 and 30%**.⁵ "Profitability is a complex and thorny issue today due to profound structural changes in the market. Ultra fast-fashion players like **Shein** rely on the technological innovations of artificial intelligence that allows them to reduce their unsold items to a minimum, and in particular, to produce on demand without worrying about social consequences," says Adeline Dargent.

As for other economic challenges, brands also face problems stemming directly from consumer behavior. Because while consumers—**Gen Z** in particular—push for more responsible fashion and say they want to support more socially committed brands, it's hard to make this desire a reality when price is still a key factor in the actual purchase. This complicates considerably the work of responsible brands as they need to find that precarious balance

between price and commitment. Because **responsible fashion—whether by using less polluting materials or in remunerating stakeholders—definitely costs more to produce**. Some brands manage to reduce their costs by capitalizing on minimalist design or quantities. But a proven magic formula has yet to be found.

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⁵ lesechos.fr

→ Legislative challenges

"Companies must comply with increasingly strict European and global regulations," explains Adeline Dargent. In France—a country pioneering in enacting laws to regulate the fashion sector—the Anti-Waste Circular Economy Act (Agec Law) adopted in 2020 imposes strict obligations on fashion companies. This legislation prohibits the destruction of unsold textiles, requiring brands to find reuse, donation, or recycling solutions. In addition, the law introduces **greater transparency requirements**, prompting companies to provide detailed information on the environmental impact of their products throughout their life cycle.

Also in France, the law enacted by the National Assembly against fast fashion on March 14, 2024 aims to ban advertising and establish **a significant environmental "surcharge."**

At the European level, the strategy for sustainable and circular textiles, launched in 2022, sets ambitious goals to make the textile industry more environmentally friendly. Among the key measures, we find **mandatory labeling showing product sustainability**, allowing consumers to make informed choices.

This strategy also encourages innovation in sustainable materials

and less polluting production processes. In addition, the European Union plans to reinforce Extended Producer Responsibility (EPR), requiring companies to **be responsible for managing their textile waste.**

Finally, the European CSRD (Corporate Sustainability Reporting Directive), applicable from January 1, 2024, sets new standards and obligations for extra-financial reporting on the company's ESG (Environmental, Social & Governance) data.⁶

Sustainable development regulations are multiplying and tightening around the world, in particular with regard to traceability. We have already identified some 30 regulations⁷, either implemented or in the pipeline, that are applicable in **Australia, Canada, the United States, and Europe**; around 20 of those will play a decisive role. In Europe, for example, supply chain due diligence laws are already in force in several countries and the Digital Product Passport (DPP) will come into effect in 2025.



"These new regulations, combining incentives and obligations, will significantly transform the fashion sector."

Anne Borfiga
General Secretary,
Lectra

"Even if the use of the DPP isn't mandatory until 2027, we can expect several European brands to take the initiative in 2025. This means that they must be able to **track the entire life cycle of their products and materials**, and that they are also in a position to provide information to their partners and consumers," says Maximilien Abadie. "These new regulations, combining incentives and obligations, will significantly transform the fashion sector," adds Anne Borfiga, General Secretary of the Lectra Group.

⁶ entreprendre.service-public.fr

⁷ lectra.com

Part 2

WHAT STRATEGIES CAN MEET THESE CHALLENGES?

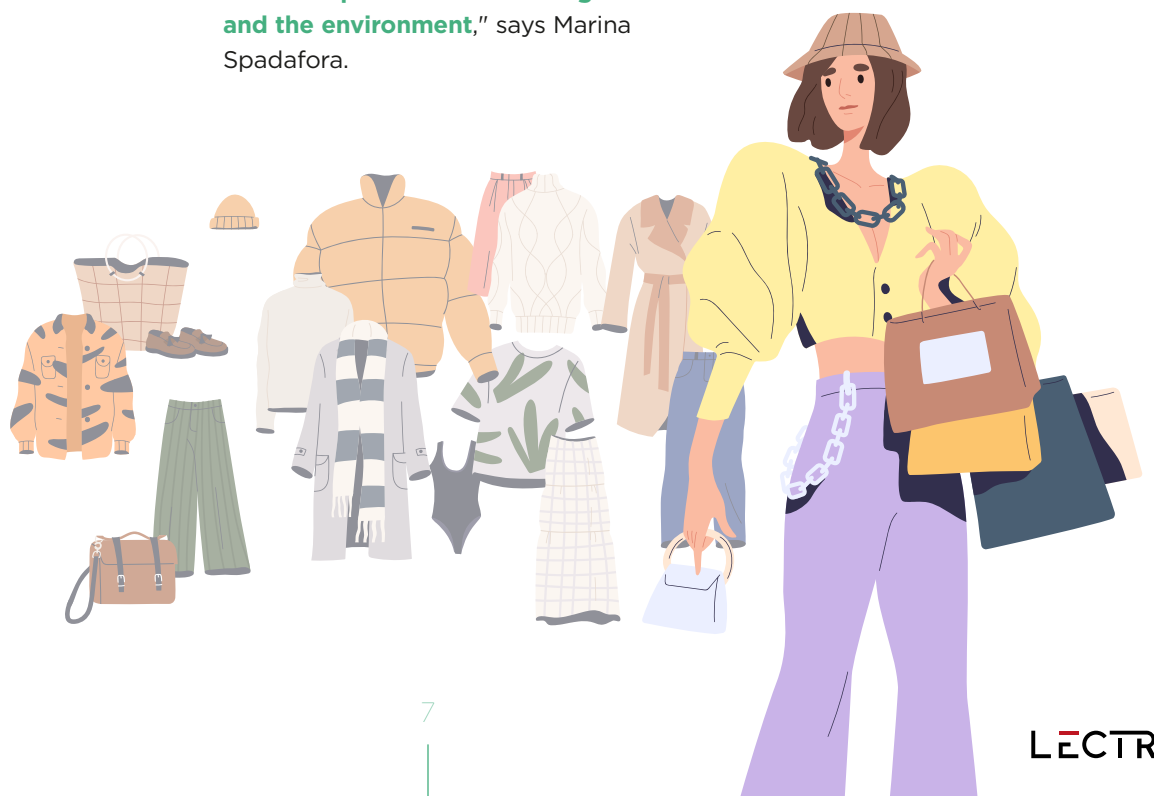
Business models put to the test

Confronted with these challenges, fashion brands opt for different and sometimes multiple business models.

→ Fast fashion and ultra fast-fashion

Ultra fast-fashion and fast fashion are increasingly sought after by consumers. These models are seductive due to **very attractive, even low, product prices**, to **numerous promotions**, to their **variety of characteristics** and to rapid stock rotation, which encourages frequent consumer visits (in-store or online) and compulsive buying. According to a study by the NGO, Friends of the Earth, published in June 2023, **Shein**, the Chinese giant, was offering 470,000 different models, available in real time on its website. But, **"this strategy comes at the expense of human rights and the environment,"** says Marina Spadafora.

The numbers speak for themselves: the groups rack up record profits. Shein made over 2 billion dollars (1.86 billion euros) in 2023, according to a financial document consulted by the Financial Times.⁸ This feat has propelled Shein to second place in the global fashion market, far ahead of the Swedish group **H&M** (760 million euros), but still far behind the Spanish group, Inditex, the owner of **Zara** (5.4 billion euros).



⁸ ft.com

→ Mid-range brands

"The mid-range brand model in France is quite complex because, with the arrival of ultra fast-fashion, fast fashion has itself changed by moving to a more premium model. A brand like Zara has become a direct competitor of French mid-range brands," comments Adeline Dargent. This is borne out by the spate of financial difficulties, with many brands forced to close their stores or go into receivership.

But "faced with fast fashion and ultra fast-fashion, brands have competitive advantages that they have worked toward and invested in, such as their network of physical stores. **Online sales represent only around 30% of the total market,**" explains Maximilien Abadie.

So to survive in a competitive and uncertain context, companies "must reinvent the in-store experience to attract new customers by creating events, with brand collaboration, for example."

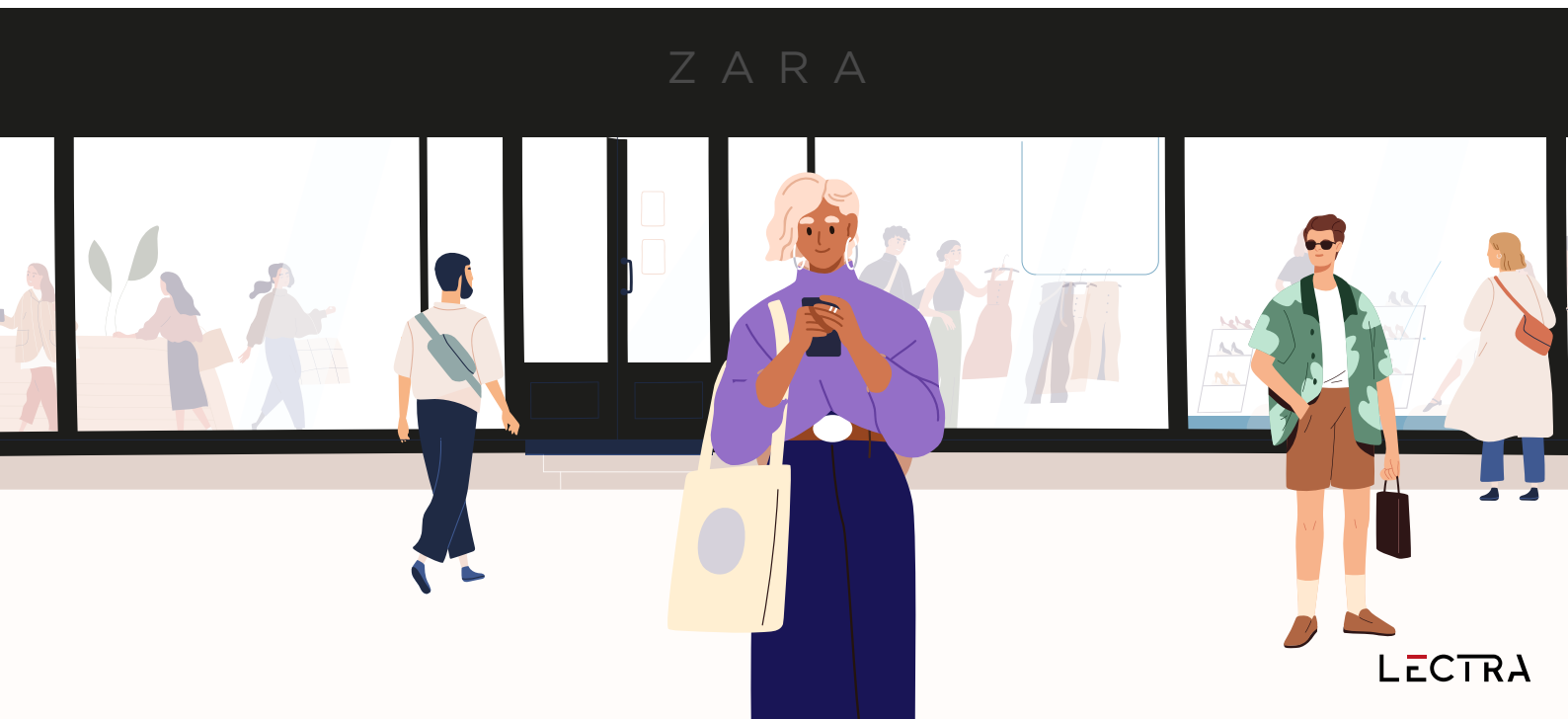
Mid-range brands suffer, sometimes to the point of extinction, because they don't have a strong history to rely on, nor do they have a community attached to values, to commitments, or to the products. "Some brands have aged with their consumers without attracting new, younger customers, which is a big mistake," says Maximilien Abadie.

These weak-image brands are founded solely on competitive prices, and have thus lost the sales war against the giants of fast fashion and ultra fast-fashion.

Because, as Adeline Dargent explains, "what works today, more than the business model, is the allure of a product or a brand at a given moment in time, it's **the potential emotional relationship with consumers.**" Certain brands, such as the French label **Sezane**, for example, have understood this well. The women's fashion label recorded annual growth of around 20%.

"Companies must reinvent the in-store experience to attract new customers by creating events, with brand collaboration, for example. "

Maximilien Abadie
Chief Strategy Officer,
Chief Product Officer,
Lectra



→ Luxury brands

At the opposite end of the fashion spectrum, luxury "is never in crisis," deems Marina Spadafora. **In fact, the luxury sector grew from 5 to 7%⁹ in 2023.**

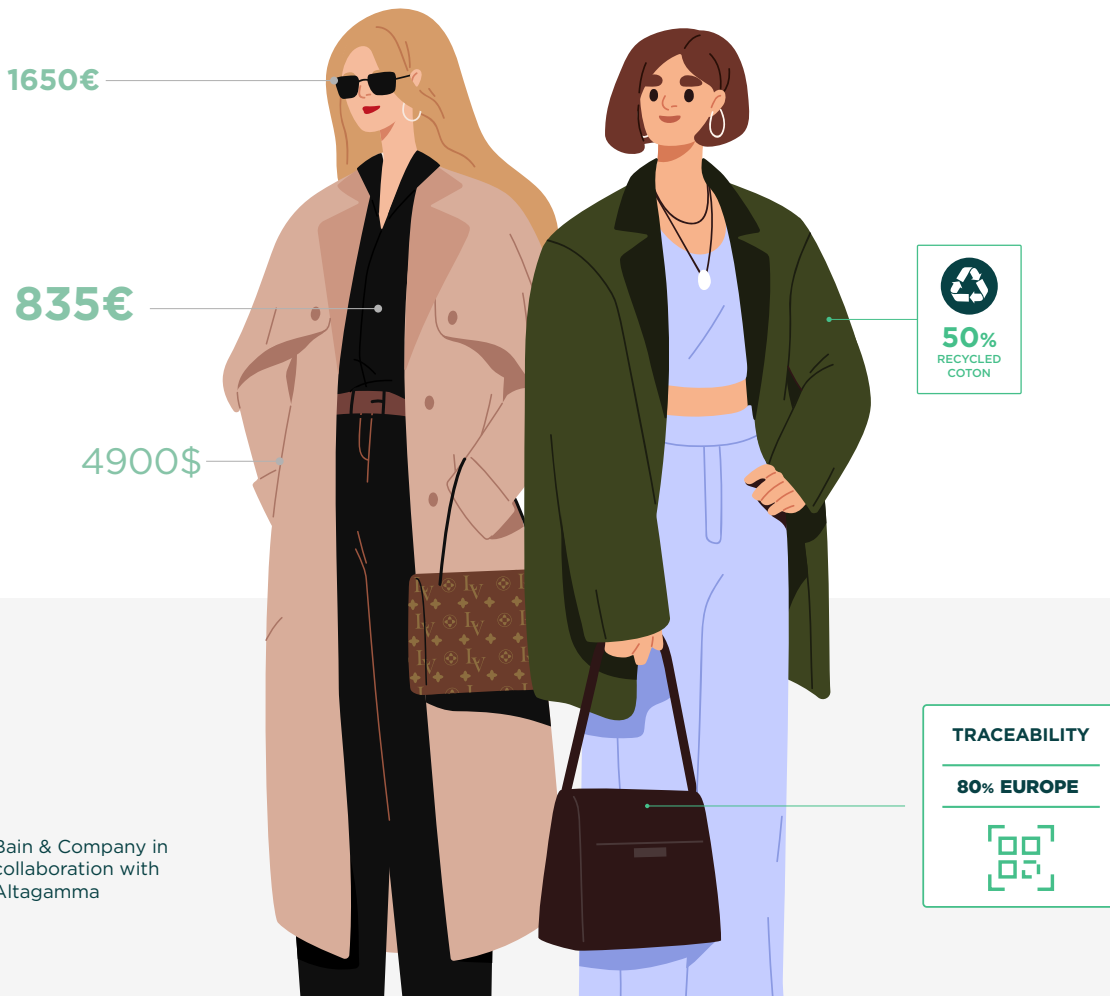
"The luxury industry is set apart by its creativity, the customer experience and the quality of its products. It manages to strike a balance between retaining loyal customers and attracting new ones. For example, **Louis Vuitton**, in naming Pharrell Williams Men's Creative Director, is venturing into a new, more urban universe, bringing together pop culture and the timeless luxury of Louis Vuitton with its iconic monogrammed bags, for example," states Maximilien Abadie.

→ Responsible brands

Sezane is not the only one to have been successful in this endeavor. The American brand, **Unspun**, for example, creates made-to-measure jeans. It's one way to involve consumers in the production process. The ethical French brand **Patine** has succeeded in creating a relationship of trust with its customers by using private chat groups to take them behind the scenes of the creative and production processes. This transparency is necessary for eco-friendly brands that have to stand out from the crowd in an ultra-competitive context of ever-lower prices. The American brand, **Everlane**, has made its mark by promoting radical transparency and by providing detailed information about its factories and manufacturing conditions.

Transparency, ethics, circularity, the use of more eco-friendly raw materials—such as the Chinese brands **Erdos** for cashmere and **Bosideng** for technical clothing or the Italian brand **Cingomma**, which recovers inner tubes and bicycle tires—these are all commitments undertaken by responsible brands.

Unfortunately, few eco-friendly brands today have been able to gain a foothold in the fashion market and survive in a tense economic climate, because, as Adeline Dargent reminds us, "the question of price is key and sustainable fashion is still more expensive to buy." A case in point: the **Slip Français** operation. To revive and survive, this company chose to cut their prices almost in half by significantly increasing the quantities ordered from its suppliers. This operation also proves that **collaboration among all stakeholders in the garment production chain is needed.**



⁹ Bain & Company in collaboration with Altgamma

The emergence of new business models

"We are seeing new business models emerge that are linked to the circular economy, where waste reduction and the preservation of natural resources are priorities," explains Scot Case, Vice President of Corporate Social Responsibility and Sustainability at the American National Retail Foundation (NRF). These business models include recycling, upcycling, second-hand, rental, and pre-order. "These models are being developed through the use of technologies that allow these new ways of consuming and producing to reach an industrial scale," says Scot Case.

A case in point is the American brand, **Patagonia**, and its *ReCrafted* initiatives for transforming damaged garments into new unique pieces and *Worn Wear* for encouraging its customers to repair their garments or send them back to be recycled. The **Eileen Fisher** brand has also developed its *Renew* upcycling program. In addition, the DPP (Digital Product Passport) could promote the emergence of these new practices by advising consumers on the end-of-life of their products.

With regard to the second-hand model, **Vestiaire Collective** has established an international presence in the second-hand luxury market, as has **Hongbulin** in China, and **Rent the Runway** paved the way for the rental model. And because these recent models are not necessarily obvious paths of development for traditional brands, some new players have emerged with the goal of facilitating circularity. "The English company, **ACS Clothing**, for example, enables brands to introduce a rental or resale model while managing all logistics-related issues," concludes Professor Stephen Russell, Director of the Leeds Institute of Textiles & Colour (LITAC).



"These business models include recycling, upcycling, second-hand, rental or pre-order."

Scot Case
Vice President of Corporate Social Responsibility and Sustainability at the NRF

Summary table of business models

BUSINESS MODELS	STRONG POINTS	WEAK POINTS
<p>Fast fashion</p> <p>Ultra fast-fashion</p>	<ul style="list-style-type: none"> → Aggressive pricing → Stock rotation → Variety of characteristics 	<ul style="list-style-type: none"> → Negative social and environmental impact → Overproduction
<p>Mid-range brands</p>	<ul style="list-style-type: none"> → Attractive pricing → Physical points of sale 	<ul style="list-style-type: none"> → Lack of values or strong history → No emotional relationship with customers
<p>Luxury</p>	<ul style="list-style-type: none"> → Retains loyal customers while attracting new consumers → Market mastery 	<ul style="list-style-type: none"> → Lack of transparency for consumers
<p>Responsible brands</p>	<ul style="list-style-type: none"> → Trust/emotional relationship with consumers → Transparency → Innovative business models (second-hand, rental, pre-order, etc.) 	<ul style="list-style-type: none"> → High prices



Part 3

HOW CAN TECHNOLOGY BETTER RECONCILE SUSTAINABILITY, RESPONSIBILITY, PROFITABILITY, AND GROWTH?

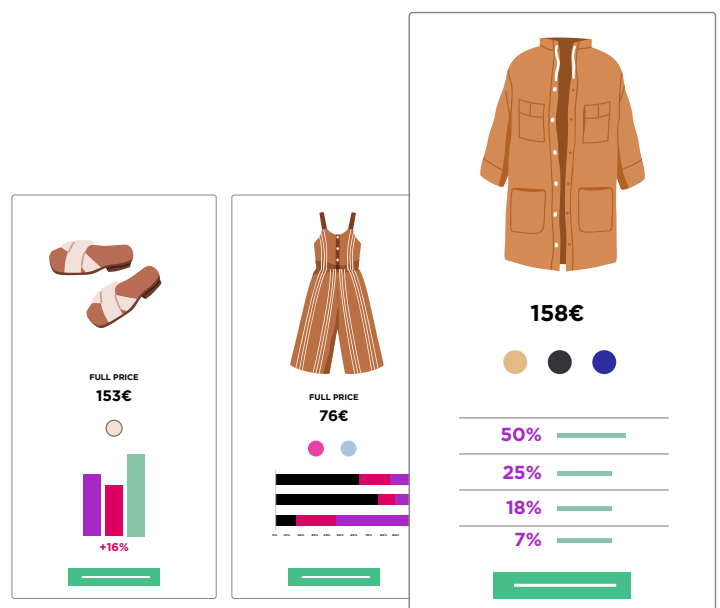
The advantages of technology

In the context described above, technology emerges as an essential lever in reconciling sustainability, responsibility and profitability imperatives. Technological advancements allow fashion companies to respond to the growing expectations of consumers while **optimizing their operational processes**. Artificial intelligence, blockchain, and even 3D printing play a crucial role in this transformation. They provide more efficient resource management, increased supply chain transparency, and waste reduction. By incorporating these technologies, companies can not only **increase their economic performance, but also reduce their environmental footprint and adopt more ethical practices**.

"To face the current challenges, players in the textile industry must adopt **systemic changes**, and if a single technology does not resolve all the issues, using several technologies may allow companies to adapt, survive, and be profitable, explains Stephen Russell.

"The challenge is making data and technologies more accessible," states Scot Case. According to Maximilien Abadie, some already are, "but you have to know how to integrate them into your business model so you can analyze the market, competitors, and consumers and know what product to sell when."

Adeline Dargent identifies three essential pillars for using technology. First, **traceability**, to identify and reduce the impact of production lines. Then, **logistics**, using artificial intelligence which provides better stock management and thus a reduction in unsold items. Finally, **materials recycling**, for more virtuous resource management.



Efficient technology examples

→ The importance of data

Data collection during garment production is crucial for improving the efficiency, sustainability, and quality of the entire production process. By saving detailed information on the origin of raw materials, production conditions, and supplier performance, companies can identify opportunities for optimization. This data is also used to track labor standards and environmental impact, ensuring regulatory compliance. In addition, by analyzing market trends and customer preferences, brands can adjust their production to better meet demand, **preventing surpluses and unsold items**. Thus, data collection supports more agile supply chain management.

"The pace of fashion has accelerated, and it has now become complicated to predict what colors will be in vogue a year in advance.

"Efficient technology is a technology that informs and helps consumers make conscious and more responsible choices."

Marina Spadafora
Italian sustainable fashion consultant

Solutions can now quickly analyze thousands of digital images from social networks and fashion shows, using a combination of algorithms, to regularly predict color trends," explains Stephen Russell.

Finally, to meet regulatory challenges, such as the DPP (Digital Product Passport), **PLM or PIM tools** (Product Life Management or Product Information Management) are real assets. By centralizing the data, brands can better manage their collections, reduce their carbon footprint, have better material traceability and provide the necessary data to authorities, partners, and consumers. For example, if the PLM tool has a direct API connection with the French government website (**Ecobalyse**), brands can automatically calculate their PEF score and ensure that they are in full compliance with constantly evolving regulations such as the **AGEC Law** and the objectives of the European Green Deal.

With traceability being the main challenge to sustainable fashion, brands must be able to rely on suitable platforms. Technology now makes it possible to trace the production chain, from fiber to finished product, and to have an **accurate map of all players involved**. This gives brands the ability to analyze and minimize their impact. Traceability tools can provide end consumers with transparent information. And data access is a precious commodity for brands and consumers within the logic of eco-friendly production/consumption. "Efficient technology is a technology that informs and helps consumers make conscious and more responsible choices," explains Marina Spadafora, through QR codes on garment labels in particular.



→ Artificial intelligence tools

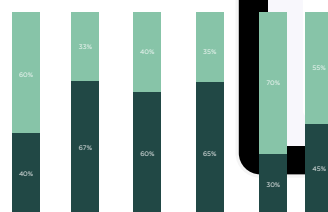
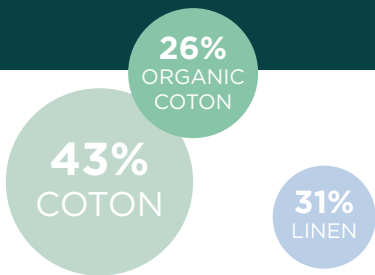
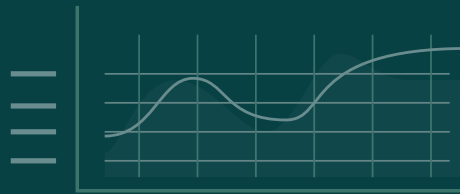
While artificial intelligence (AI) is revolutionizing the fashion industry by improving accuracy, customization, and process efficiency, it is fundamentally data-driven. Fashion brands must therefore excel in managing and analyzing data generated at each step of the value chain of a garment.

AI algorithms analyze vast quantities of data to anticipate trends, optimize stock and customize product recommendations for consumers. In the supply chains, AI **improves traceability**, predicts disruptions and optimizes logistics, reducing both costs and carbon footprint.

By integrating AI, fashion brands can not only meet consumer expectations more quickly, but can also **adopt more sustainable and profitable practices**.

"Shein has invested heavily in data analysis: all players in the supply chain are interconnected and know what quantities and characteristics to produce on a daily basis," states Maximilien Abadie. With this, the ultra fast-fashion giant has demonstrated the **power of planning** using artificial intelligence.

AI algorithms analyze vast quantities of data to anticipate trends, optimize stock, and customize product recommendations for consumers.



Shirts & Blouses | Short sleeve blouse | Original Page

Cotton Poplin Peplum Tie Blouse
GANNI (EU)
Price: €175
Color: Black [Color Swatches]
Sizes: 10-11/12-13/14-15/15-16
Fabrics: 100% Organic Cotton

EU Market Price History 2023-2024

Stock History

→ Resource management

Technology is efficient when it **saves resources** which, as we know, are rapidly diminishing as a result of climate change. In addition to cutting optimization software, 3D software enables **garments to be designed virtually**, reducing the waste associated with prototypes. Adidas also uses 3D technology to manufacture shoe soles. And there are many 3D applications. "Some solutions, for example, are used to optimize production by minimizing fabric and resource waste, through automated 3D weaving technologies that merge weaving and garment production into a single step," says Stephen Russell.

→ Production on demand

"We have technologies that allow us to scan the entire fashion ecosystem (brand websites, social networks, etc.) to produce products that meet demand as closely as possible, thereby reducing stock and unsold items. The ultimate objective for brands is to sell what they produce," says Anne Borfiga. Overproduction is at the heart of the problem for many brands, in particular for those who are committed to more sustainable fashion. Yet, Kate Fletcher would like the industry to go even further: "If, instead of using artificial intelligence to predict what consumers want, we use it to predict what they need, we could respond to fashion's major problem: production volumes."

"Some solutions are used to optimize production by minimizing fabric and resource waste, through new technologies."

Stephen Russell
Director of the Leeds Institute of Textiles & Colour (LITAC)



CONCLUSION

The fashion industry faces complex challenges, whether environmental, social, legislative, or economic. To meet these challenges, various strategies are being implemented, among them, the use of new technological tools. This is because technology plays a key role in this transformation by making information more readily available, reducing waste, optimizing resources, ensuring product traceability and by meeting consumer needs.

Of course, technology is not the only solution to today's challenges. Policies and consumers, or rather citizens—Kate Fletcher recommends changing the vocabulary—can also make a major contribution to the emergence of more responsible behavior. How? Through the implementation of new laws, consumer choices, or even through investments aimed at supporting industrial recycling and circular economy initiatives. Because the goal is clear: to **build a future where the textile industry can prosper without compromising our planet's resources or workers' well-being.**