

# Is apparel manufacturing coming home?

Nearshoring, automation, and sustainability – establishing a demand-focused apparel value chain

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# Introduction

*Tomorrow's successful apparel companies will be those that take the lead to enhance the apparel value chain on two fronts: nearshoring and automation. It cannot be just one of them and it must be done sustainably.* Apparel companies can no longer conduct business as usual and expect to thrive. Due to the Internet and stagnation in key markets, competition is fiercer than ever and consumer demand is more difficult to predict. Mass-market apparel brands and retailers are competing with pure-play online start-ups, the most successful of which can replicate trendy styles and get them to customers within weeks. Furthermore, apparel companies have lost much of their clout in trendsetting. In most mass-market categories, today's hottest trends are determined by individual influencers and consumers rather than by the marketing departments of fashion companies. Pressure on profitability due to decreasing full-price sell-through as well as increasing concerns regarding the environmental impact of overproduction call for agile production in smaller batch sizes and for on-demand replenishment.

In light of these factors, speed to market and in-season reactivity are now more critical than ever to apparel players' success. Indeed, nearly two-thirds of US apparel executives<sup>1</sup> and about 80 percent of international chief procurement officers (CPOs) say that these two capabilities are top priorities.<sup>2</sup> The problem is, most of the established fashion players are burdened with slow commercial processes and legacy supply chain and sourcing setups – and therefore struggle to keep up with more nimble competitors.

Mass-market apparel brands and retailers cannot win in the next decade without speeding up and transforming to a demand-focused model. Apparel companies are applying four key levers to support the transformation. One is **optimization of current processes**, e.g., central cross-functional merchandising teams, reduction of approval iterations, and closer collaboration with suppliers.<sup>3</sup> Another is **digitization of processes** along all phases of the fashion cycle – from intelligent consumer insights to virtual design and prototyping to integrated vendor-management tools and digital sell-in. They will **rethink inbound logistics**, aiming to strike an effective balance of air versus sea freight and establish highly efficient warehouse processes. And the other is **optimizing the apparel production model**, on which we will focus in this white paper, including elements such as nearshoring, automating new delivery models around customization, and shifts toward sustainable, circular value chains.

Two decades ago, US and European mass-market apparel brands and retailers were rushing to move as much production to Asia as possible in order to gain a cost advantage. Since then, it has been a unit-cost play, in which adjusting the sourcing footprint and moving from China to even more cost-efficient frontier markets has been the focus. Apparel players that have successfully done this, while still ensuring high quality, speed, and compliance, have been able to deliver relevant products to consumers at the best prices. So, the question is: is apparel manufacturing coming home?

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1 Survey of 100 US apparel executives by McKinsey and Women's Wear Daily. The need for speed: Capturing today's fashion consumer, McKinsey & Company, Inc., March 2018, [www.mckinsey.com/industries/retail/our-insights/the-need-for-speed-capturing-todays-fashion-consumer](http://www.mckinsey.com/industries/retail/our-insights/the-need-for-speed-capturing-todays-fashion-consumer)

2 Based on the 2017 McKinsey Apparel Chief Procurement Officer (CPO) Survey. Digitization: The next stop for the apparel-sourcing caravan, McKinsey & Company, Inc., September 2017, [www.mckinsey.com/industries/retail/our-insights/digitization-the-next-stop-for-the-apparel-sourcing-caravan](http://www.mckinsey.com/industries/retail/our-insights/digitization-the-next-stop-for-the-apparel-sourcing-caravan)

3 Measuring the fashion world: Taking stock of product design development, and delivery. New white paper on product development and end-to-end process optimization to be published October 25, 2018

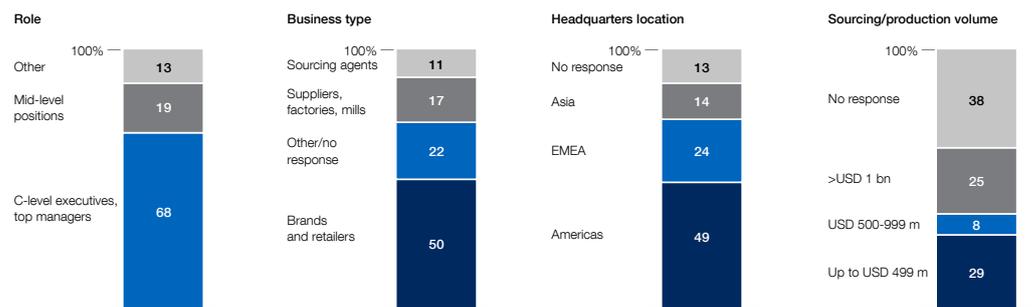
Today, the industry is at a crossroads, where speed beats marginal cost advantage and basic compliance is upgraded to an integrated sustainability strategy. While the traditional supply chain setup is now being challenged and as labor costs converge, mass-market brands and retailers are starting to more broadly rethink their sourcing and production models. Moves to increase nearshoring and more automated production models have the potential to further enable sustainability and to support the adaptation of a circular economy in the apparel sector. Mass-market apparel players that embrace automation technologies to become faster and more sustainable will likely be tomorrow's winners.

For many apparel companies, this may seem like a daunting task. Their lead times are long; their production processes laborious and linear. So, what can they do? The answer is to make bold, yet disciplined and balanced investments in nearshoring, automation, and sustainability – and to do it immediately. The aim of this white paper is to help mass-market apparel brands and retailers embark on this journey. It clarifies the future demand-led apparel sourcing and production models, their current economic viability, and the future outlook.

To develop this white paper, we collaborated with the leading textile technology and textile manufacturing research institute, the Institut für Textiltechnik of the RWTH Aachen University, as well as our Digital Capability Center Aachen (DCC Aachen) on analyzing current and potential automation technologies. We also worked with the economic think tank McKinsey Global Institute (MGI) to better understand the future of factor costs. Additionally, we conducted interviews with a broad range of international experts and practitioners in apparel manufacturing and retailing as well as robotics and sustainability. We also asked apparel sourcing executives and industry participants to comment on the industry disruptions of nearshoring, automation, and sustainability in a survey conducted in September 2018.<sup>4</sup>

Our white paper also provides guidance on where to start the journey based on transformation work we have conducted with international apparel manufacturers, brands, and retailers.

<sup>4</sup> McKinsey and Sourcing Journal Survey, September 4-13, 2018. The 188 respondents were sourcing executives and managers as well as Sourcing Journal readers



# Is apparel manufacturing coming home?

Faster fashion<sup>5</sup> and in-season flexibility are keywords in providing an attractive offer to consumers and for being successful in the challenging market environment. Only if companies transform from the historical supply focus to a demand focus can they stay relevant for consumers and improve top- and bottom-line performance. Increasing costs in traditional supply markets add to the margin pressure apparel players face today. In this environment, going from a pure unit-cost strategy to one of product profitability in sourcing provides a strong supporting argument for the inevitable shift to nearshoring for US and European mass-market apparel brands and retailers. Nearshoring will happen, but not without challenges.

## Era of change

The apparel industry is going through a decisive era of major consumer, channel, and supply shifts while suffering from increased economic volatility.

One factor contributing to greater volatility is the shift to bottom-up trend setting. In the past, consumers were spoon-fed trends via apparel companies' ad campaigns. For decades, this "push" model worked for apparel players. Today, however, in many segments in the mass market, trends are more likely to pop up from the street. Consumers take their style cues from Instagram, user reviews, and their peers, and not so much from big brands' marketing gurus. Individuals – whether they are celebrities or simply stylish consumers who have generated large followings on social media – have become the trendsetters and tastemakers. A new generation of consumer insights is gaining importance for the design and product development process. Even some of the traditional "fast-fashion" companies have not been able to switch quickly enough from the "push" to a "pull" model – a model in which products are developed, tested, and produced on demand. Traditional multilabel retailers are putting pressure on brands to increase their responsiveness, as the old preorder model is losing out to an increasing share of in-season open-to-buy approaches. Some players have, in fact, started tests to taking "on demand" more literally. Li & Fung, for example, has tested the sale of products before actual production takes place. The brand used virtual 3D renderings and started the production process only after consumers' orders were received.

Additionally, sales volatility in the fashion market is amplified by the continued shift to online and emergence of new business models. Brick-and-mortar stores, once indispensable for showcasing clothes and driving sales volume, are no longer correlated with the apparel industry's success. The online channel makes it so easy for a shopper to browse many apparel collections on a variety of Websites – and to do so all in a matter of minutes. One consequence of this migration to e-commerce is greater volatility in apparel companies' sales. Pure-play online apparel companies typically have an agile supply chain to help them manage this volatility. Short product development calendars, sourcing of small batch sizes, and nearshoring are key here. Some online companies, such as Boohoo and Lesara, are emerging as a new generation of ultra-fast-fashion players, overtaking the first-generation fast-fashion leaders in speed to market and growth rates.

Many mass-market apparel brands and retailers are struggling to adapt to the new reality and continue to produce high volumes of stock in bulk orders to sell based on plans

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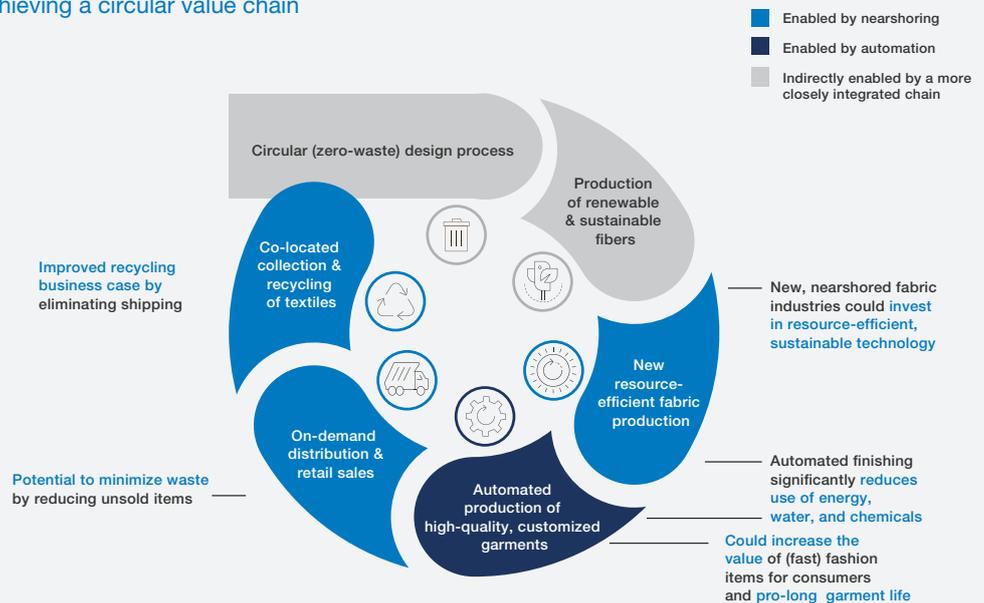
<sup>5</sup> Faster fashion: How to shorten the apparel calendar, McKinsey & Company, Inc., May 2018, [www.mckinsey.com/industries/retail/our-insights/faster-fashion-how-to-shorten-the-apparel-calendar](http://www.mckinsey.com/industries/retail/our-insights/faster-fashion-how-to-shorten-the-apparel-calendar)

generated months (or even more than a year) before they are offered to consumers. Overstock filling up stores and warehouses as well as increasing levels and frequency of markdowns are rampant in today's apparel market. About 3 percent of unsold apparel is liquidated.<sup>6</sup> And consumers are becoming increasingly aware of the environmental impact of traditional linear apparel production modes and the public outcry concerning overstock liquidation is becoming louder. Some 78 percent of respondents to our survey state that sustainability will also be somewhat/highly likely a key purchasing factor for mass-market apparel consumers by 2025. Increasingly more apparel players are including sustainability as an integral part of their businesses and are beginning to look at circular economy models for solutions. Adopting the position of a "truly circular fashion choice" is seen as highly likely to be a winning strategy by 2025 by more than a quarter of respondents. Nearshoring and automation are important enablers in implementing a circular apparel value chain (Exhibit 1).

While balancing cost, compliance, and capacity was the name of the game in an Asia sourcing model just a few years back, we expect that more apparel players will include the nearshoring, automation, and sustainability triangle in their decision making on sourcing and production models in the future.

### Exhibit 1

#### Nearshoring and automation could be important enablers in achieving a circular value chain



Source: Interviews with experts; McKinsey

The confluence of these market shifts means that speed and agility are now on the radar for winning apparel players and on-demand replenishment has increasingly become a make-or-break capability. By reducing time to market, apparel companies can act on nascent trends, scale up their winners, and eliminate their losers – all within a single season.

<sup>6</sup> New textiles economy: Redesigning fashion's future, Ellen MacArthur Foundation, November 2018, [www.ellenmacarthurfoundation.org/assets/downloads/publications/A-New-Textiles-Economy\\_Full-Report\\_Updated\\_1-12-17.pdf](http://www.ellenmacarthurfoundation.org/assets/downloads/publications/A-New-Textiles-Economy_Full-Report_Updated_1-12-17.pdf)

It used to be that a six-month fashion cycle was considered fast. Today, speedy time to market means no more than six weeks and some retailers are able to do it even faster. But by no means should mass-market apparel brands and retailers aspire to apply speed models to their full assortment – to be successful, they will have to strike the right balance in a multimodal sourcing strategy in which low-cost countries and traditional production will continue to play a big role (see “Defining the future sourcing and production strategy” below).

While moving to a demand-led model requires apparel companies to pull levers in all phases of the fashion cycle, bringing production back closer to consumers with near- or onshoring offers the opportunity to eliminate big chunks of lead time.

Over the past decades, US and European apparel companies have offshored the bulk of their manufacturing to China and other Asian countries to take advantage of the dramatically lower labor costs there. But the offshoring model is hardly compatible with the new need for speed. Shipping inventory from Asia via sea to Western markets typically takes 30 days. Such a long lead time eliminates any possibility of flexibility and differentiation. Air freight is an option, but an expensive one; it is also not environmentally friendly, a consideration that will increase in importance.

The benefits of offshoring could shrink even further given geopolitical tension, which is driving uncertainty in trade agreements and exchange rate developments. Duties (of 9 to 12 percent) could increase and play a much more prominent role in the economics of sourcing and production.

The offshoring sourcing strategy of US and European mass-market players is under pressure for other reasons as well, including Asia’s rising demand for apparel. Whereas in the past, the strongest demand for clothing came from the West’s developed markets, demand growth today mostly comes from other parts of the world, particularly the Far East and the Southern Hemisphere. Consumers in Asia are buying more clothes than ever before and their appetite is far from satiated: apparel sales in Asia are projected to grow by 6 percent each year, accounting for about 40 percent of global sales by 2025.<sup>7</sup> This burgeoning local demand is creating competition for Asia’s apparel manufacturing capacity and changing the export balance. Though there are not yet substantial capacity issues, many Chinese manufacturers are switching their focus and producing for the local market since the demand is so high.

Given these market shifts, it is not surprising that 79 percent of respondents in our survey believe that a step change in nearshoring for speed is highly/somewhat likely by 2025, especially as the economics of nearshoring are starting to add up (Exhibit 2).

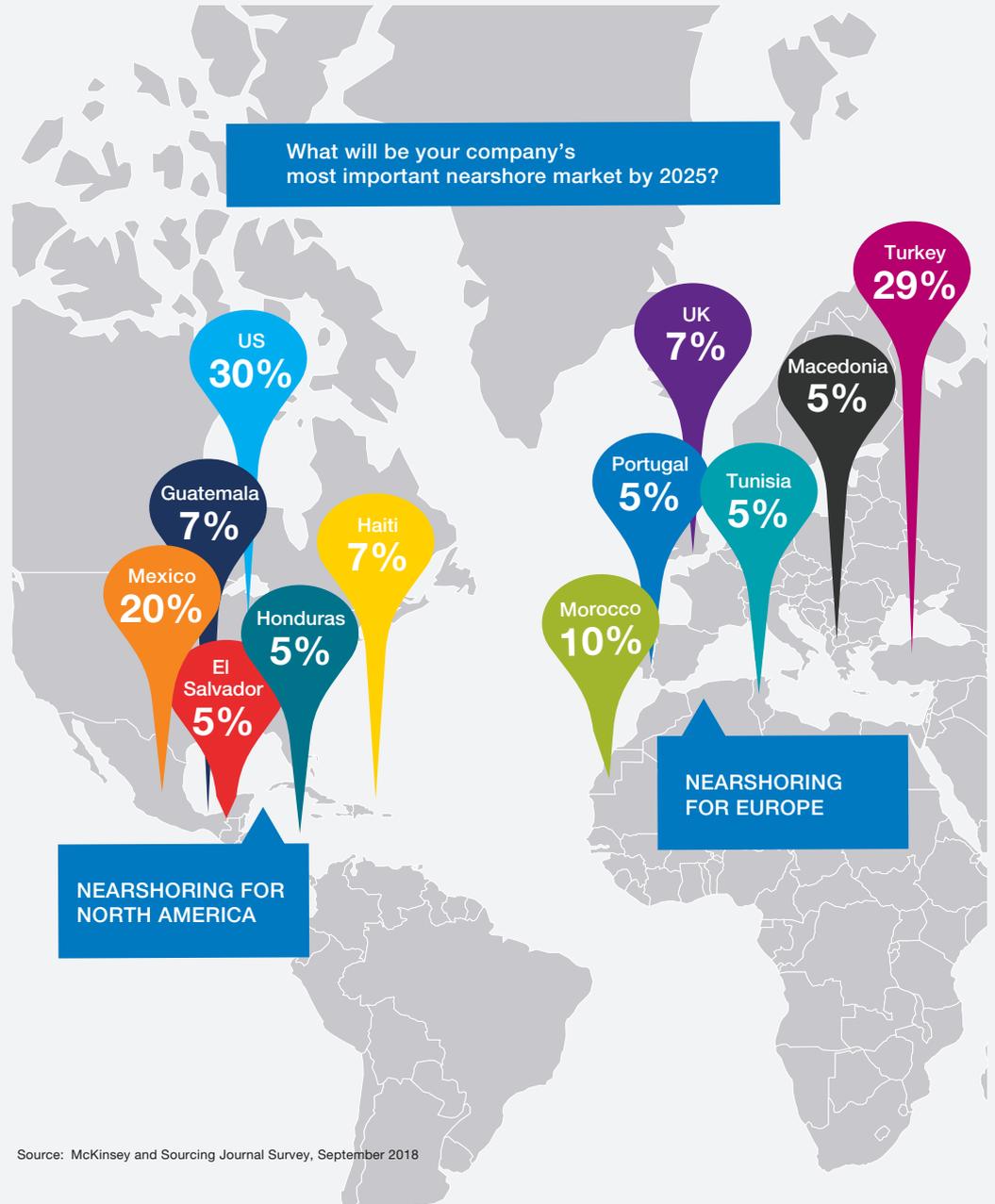
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<sup>7</sup> McKinsey FashionScope in The State of Fashion 2017, McKinsey & Company, Inc. and The Business of Fashion, November 2016, [www.mckinsey.com/industries/retail/our-insights/the-state-of-fashion](http://www.mckinsey.com/industries/retail/our-insights/the-state-of-fashion)

## Exhibit 2

### Potential winners in a future shift to nearshoring

Percent of respondents; countries mentioned by ≥5%



### Nearshoring breakeven

Production in the Far East is no longer as cost efficient as it used to be. Wages for factory workers across Asia have risen. For instance, labor costs in China in 2005 were one-tenth of those in the US; today, they are about one-third. In some nearshore markets, the gap to offshore labor costs has even disappeared, while a lack of capability and capacity continues to prevent any quick shifts in production footprint.

Take Mexico as an example of a nearshore market for the US: today, Mexico offers lower average manufacturing labor costs than China. While development in nearshore countries for the Western European market is moving in a similar direction, manufacturing labor costs are still higher than those in China – but the gap is shrinking. Whereas hourly manufacturing labor costs in Turkey were more than 5 times higher than those in China in 2005, the factor diminished to only a factor of 1.6 times by 2017.

Today, even from a mere landed cost price perspective, nearshoring can be economically viable in certain cases, mostly due to savings in freight and duties. For instance, a US apparel company that moves production of basic jeans from either Bangladesh or China to Mexico can maintain or even slightly increase its margin, even without higher full-price sell-through (Exhibit 3). For Europe, unit costs still remain significantly lower when sourcing from Bangladesh, but reshoring from China to Turkey is economically viable. Landed cost prices for denim, for example, can be 3 percent lower when sourced from Turkey. Onshoring the production to the US or to Germany, however, will not result in breaking even. Which means that while it is attractive from a landed cost perspective for production to move closer, it is less attractive for apparel manufacturing to come home.

### Exhibit 3

#### Savings on freight and duties make nearshore alternatives cheaper than China

2016/2017's prices and import duties, Jeans example

	Shoring location	Freight Mode/days	Landed cost price <sup>2</sup> USD per pair of jeans	Δ China (base case)
Offshore	Bangladesh	30	10.68	-11%
	China	30	12.04	0%
Nearshore	Mexico	2	10.57	-12%
Onshore	USA	n.a	14.05	+17%
Offshore	Bangladesh	30	9.94	-20%
	China	30	12.46	0%
Nearshore	Turkey	3-6	12.08	-3%
Onshore	Germany	n.a	30.36	+144%

<sup>1</sup> EU destination port in Hamburg, Germany. US destination port on southern coast/Austin (nearshore), West coast/LA (offshore)  
<sup>2</sup> Assuming that fabric and other costs remain constant  
Source: EUROSTAT; EIU; IHS; Xeneta; WITS; European Commission; McKinsey Cleansheet Solution; McKinsey analysis

These considerations on their own make a strong initial case for exploring the nearshoring opportunity. Decisions about the future production footprint of each product type should be based on two main criteria: the cost reduction from nearshoring and the commercial value of reducing lead times. Shorter lead times will have high commercial value for on-trend items. As a company gets items into stores faster, it will be able to test and scale more styles. Not only will it be able to boost sales volumes and sell-through rates, but the company can also reduce inventory levels and mitigate the brand dilution resulting from markdowns and clearances.

Nearshoring economics, therefore, become even more attractive when considering the higher full-price sell-through rates, which the faster fashion model enables. Our analysis suggests that a 5-percentage-point increase in sell-through would make up for the higher labor costs. Costs are equalizing, even in shifts from low-cost countries, such as Bangladesh, to nearshore markets. If a US company were to source a pair of jeans from Mexico instead of Bangladesh, the product's margin before SG&A would increase by about 3 percentage points. A prerequisite to achieving these targets, as explained in the following, is overcoming the capacity and capability challenges in the near- and onshoring markets.

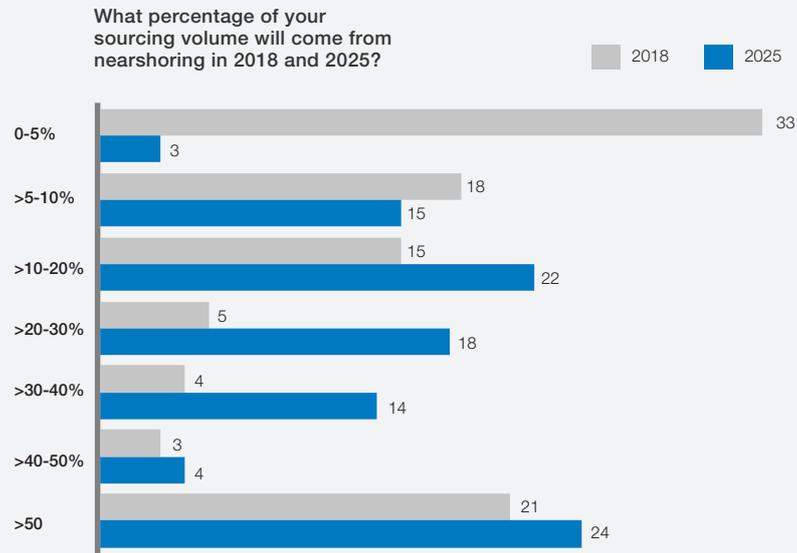
Combining the cost perspective on near- and onshoring with the commercial value of reducing lead times on a product-by-product basis requires a two-step evaluation. The first step is to determine the required sell-through increase for a nearshoring breakeven based on labor intensity, labor rates, and the garment price. A more complex garment needing about 60 minutes of manual labor time would require a significant increase of 6.1 percentage points of the full-price sell-through rate in order to reach the breakeven margin if the production moved from China to the US. For basic garments requiring less manual labor, onshoring to the US is cost competitive compared to China without additional sell-through improvements. The second step involves assessing the feasibility to achieve breakeven based on historical sell-through and volatility, in which greater historical volatility implies more room for improvement and an additional upside from increased sales (not just from increased full-price sell-through rates).

When we asked about plans for shifting volume to nearshoring locations in our survey, even players with very low levels of nearshoring today anticipate a move to over 10 percent of nearshoring volume of total sourcing volume (Exhibit 4).

## Exhibit 4

### Aspiration level for a shift to nearshoring

Percent of respondents



Source: McKinsey and Sourcing Journal Survey, September 2018

As we will discuss in the next section, the breakeven perspective needs to be accompanied by other country-specific factors. Furthermore, the increased internal costs resulting from a move to a more complex sourcing model with a higher number of sourcing countries should be taken into consideration.

### Overcoming challenges in nearshoring

Nearshoring is going to mean a number of trade-offs and challenges in terms of industry structure, productivity, operating model, sustainability, and supply.

The apparel manufacturing industry in nearshore countries in the Americas, Turkey, or Eastern Europe has a distinctly different profile from the Asian manufacturing powerhouses. The current import volume from the five biggest nearshoring markets to the US, for example, does not even account for half of the US imports from China. The garment manufacturing landscape in Central and Eastern Europe is fragmented and follows (to a significant degree) the outward processing trade model. Quality and labor productivity in some nearshore countries are more volatile. Additionally, nearshore countries come with their own environmental and social compliance risks, although much of the industry watchdogs' current focus is on the large Asian sourcing markets.

One of the biggest challenges currently is sourcing of raw materials, fabrics, and ingredients. Only a co-located value chain can offer the full speed and flexibility in the supply chain – without it, the longer lead times are just shifted further up in the value chain. However, the current bulk of production and consumption with the main fiber types, for example, is regionally focused on Asia. China plays a lead role as a supplier for yarns and fabrics, also for neighboring low-cost sourcing countries. In nearshore countries for US and European

apparel markets, the existing capacity is limited and local yarn and fabric supply varies greatly. The well-developed European fabric and yarn industry is focused on premium and luxury customers. Building new yarn-spinning and fabric mills takes time and requires high capital expenditure. To attract manufacturers to invest in building the capacity requires apparel brands and retailers to act as true partners and commit to order volumes. The discussion of regional supply chains is gaining additional traction in light of innovations in sustainability and closed-loop recycling, such as re:newcell. Some four-fifths of respondents believe that closed-loop recycling will scale up in the future.

Overall, 63 percent of survey respondents believe it is likely that fabric production will move toward nearshore to support regional supply chains by 2025. Regarding the possibility of own investment by apparel brands and retailers in fabric or garment factories, respondents are split: 49 percent have a positive leaning and 48 percent are skeptical. In the meantime, apparel companies will have to make do by increasing speed and flexibility in the garment production and finishing stage by expanding fabric libraries and integrating them into their virtual design software for at least part of their assortment, and by importing greige fabric and generic yarns from Asia.

To make the right sourcing decisions today, it is crucial to focus on full profitability of the product rather than just on landed cost price. The old sourcing model focused on unit cost price only is no longer viable. Still, the fast-cycle approach or dual sourcing models with quick replenishment are only suitable for selected parts of the assortment – so a mixed sourcing approach is needed. Successful sourcing departments will pursue a more comprehensive perspective on product profitability if they are going to support the demand-led model that successful mass-market apparel brands and retailers are moving toward. Apparel companies are starting to build the capabilities and implement the analytics and tools needed to support this intelligent-sourcing approach. Some apparel executives even go so far as to banish sourcing terminology and instead speak of supply chain departments and decision making.

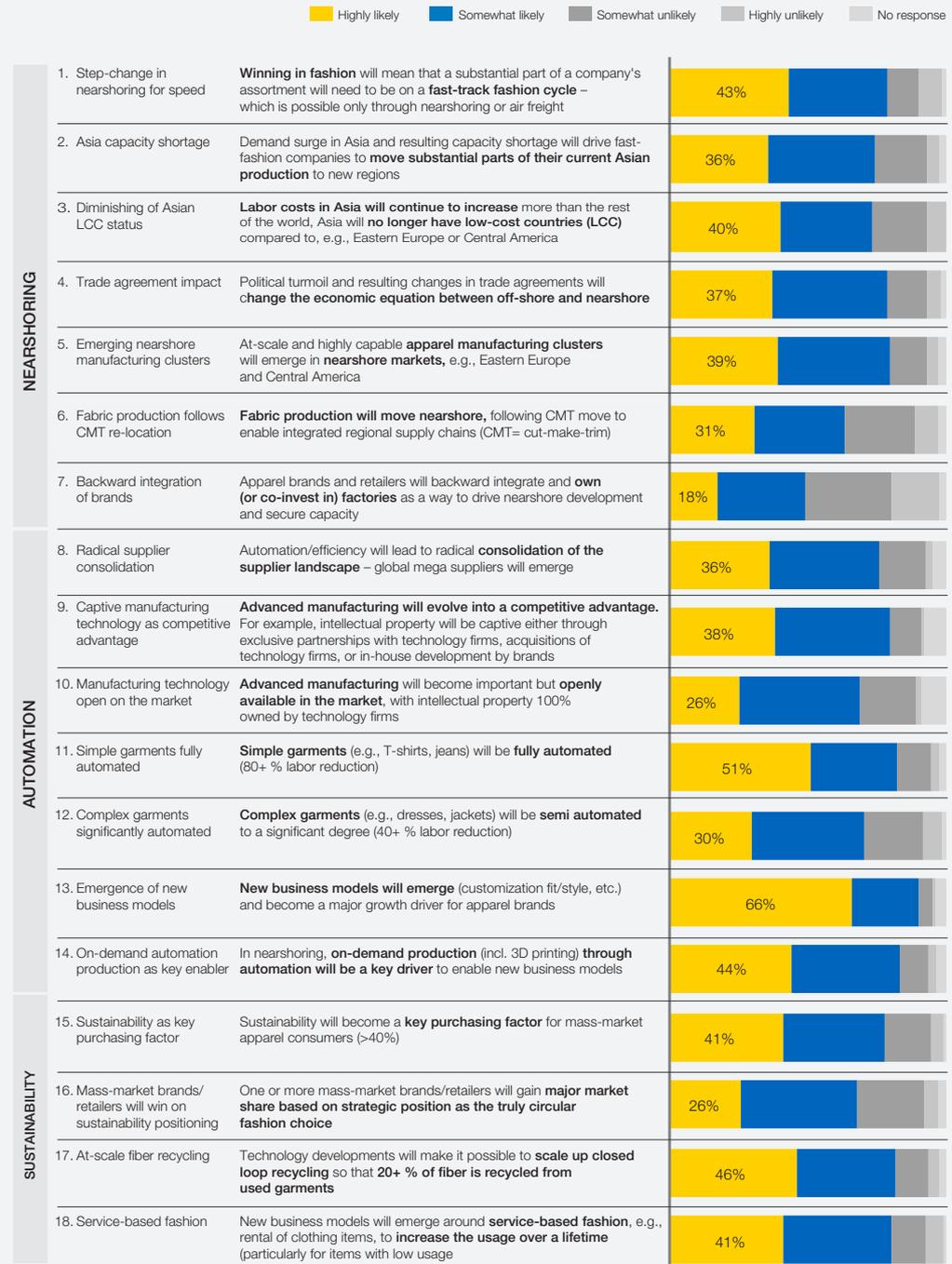
Nearshoring – and, in some cases, onshoring – will make even more economic sense as technology develops because automation will increase labor productivity, thus offsetting higher labor cost levels of near- and onshore production. From the perspective of mass-market apparel brands and retailer buyers, making decisions regarding near- and onshoring of certain products will not be focused just on the commercial importance of a short lead and the cost improvements discussed previously. They will need to consider the promise of automation (discussed in more detail in the next section) as a factor in near- and onshoring feasibility. This also means that bringing production closer to consumers through near- or onshoring will require local governments and garment industries to build the skills and capabilities needed for advanced manufacturing among the workforce in these countries.

Mass-market apparel brands and retailers, however, should not wait for further advances to occur in automation technology before they get started. They should take advantage of the situation and already begin exploring the prospect of nearshoring while becoming familiar with new potential sourcing regions.

Exhibit 5

18 major disruptions in nearshoring, automation, and sustainability

Likelihood that disruption will occur before 2025, percent of respondents



Source: McKinsey and Sourcing Journal Survey, September 2018

# The prospect of automation

As the mass-market apparel sector moves to a demand-focused, agile supply model and labor costs increase, automation will play an important role in increasing labor efficiency, throughput, and flexibility. Automation will be crucial to increasing the financial viability of on-demand near- and onshoring models.

To date, however, the apparel industry is lagging behind other sectors when it comes to automation. For example, in automotive, the most automated sector, about seven times more industrial robots are installed than in apparel; in the electronics industry, it is about four times more. Whereas some garment manufacturers have started investing in automation, neither automation nor advanced manufacturing have been a priority for the buyers at mass-market apparel brands and retailers for a number of reasons.

One reason is that apparel buyers have relied on relatively low labor costs in the core Asian sourcing markets and are now relying on the move to newer low-cost sourcing markets. Programs supported by apparel brands and retailers with manufacturers have instead focused on more traditional efficiency improvements following lean techniques as well as on compliance and sustainability measures. Another reason is the technical challenges generated by automation, especially in the sewing process, as fabrics have proven difficult for robots to handle. Only in recent years have solutions for full automation in sewing selected fabrics become market ready, while semi-automation has found some application in factories around the world. Also, fragmentation of the industry has hampered investment in automation technologies.

As on-demand apparel production gains importance and automation technologies develop, the promise of automation is becoming more relevant for US and European mass-market apparel players, especially in near- and onshoring. In the following, we will evaluate this promise in more detail. First, we will assess the key automation technologies based on complexity, potential magnitude of labor cost reduction, and capital investment. Then, we will explore the transformation opportunity of automation and nearshoring in a decision-making map on a detailed product and design level. Finally, we will provide an outlook for the future regarding the adaptation of automation.

## Promising automation technologies

Before being able to fully comprehend the prospect of automation for apparel manufacturing and its potential impact on near- and onshoring, companies need to have a detailed understanding of the technology landscape. While conducting a broad screening throughout the apparel production process, we identified the five key automation technologies that show the most promising impact on apparel manufacturing overall. We also ran economic models to predict the potential impact on production costs for a number of different products and production countries over time.

To identify and evaluate the automation technologies with the most impact, we took an overall look at current and future automation technologies for each step of the production process together with the Institut für Textiltechnik of the RTWH Aachen University and the DCC Aachen.

From this broad screening of automation technologies in apparel manufacturing, five main technologies emerged as having the most potential to drive economic impact when evaluating possible labor cost reduction and required capital investment. Automation of

sewing and logistics offers a step change in the efficiency of existing processes. Additionally, new processes are enabled by innovative technologies in gluing/bonding, knitting, and finishing.

**Sewing.** Currently the most labor-intensive step in creating a garment, sewing accounts for more than half the total labor time per garment. The potential for labor reduction is highly dependent on product type and design – as much as up to 90 percent of the sewing of simple garments can be automated. While there are a variety of different semi-automation solutions, SoftWear Automation is currently on the forefront of fully automated sewing and many others are making investments.

**Intralogistics/warehousing.** Next to sewing, this is the most labor-intensive part of the apparel production process and one of the most error prone due to issues in picking. Robotics in intralogistics throughout the production process as well as warehousing can halve labor intensity, reduce processing time and errors, and improve worker ergonomics. Technologies in the market today include overhead garment-on-hanger systems, which utilize the previously empty overhead space in a warehouse to store, sort, and pick display-ready garments, and self-driving warehouse vehicles that can transport items as well as load and unload washing machines and dryers.

**Gluing/bonding.** Emerging gluing/bonding technology will allow companies to completely bypass sewing while adding functionality to performance garments. However, the times when only outdoor brands used adhesive technology to improve water resistance are gone. Gluing today is also used in the high-end design segment. Combined with robotics, gluing and bonding have the potential to significantly reduce labor and increase the production speed.

**Knitting.** Advances in knitting technology, such as computer-controlled or 3-D knitting, enable customization and improvements in design and fit. These make knit garments more versatile and increase the garment's commercial value, likely motivating apparel companies to shift from woven to knit materials. Nike's Flyknit product line, for instance, uses a computerized knitting process that has reduced material waste by 80 percent. Knitting innovation also supports single-item production and new factory-in-store concepts.

**Finishing.** Automated finishing (e.g., digital printing, abrasives, lasers) – which is fast, low cost, and requires little labor – makes it possible for an apparel company to nearshore the finishing process. Digital printing can reduce labor by up to 70 percent and abrasives by up to 90 percent. Levi's laser technology drastically cuts finishing time for a pair of jeans (see sidebar, "Levi's lasers – from 20 minutes to 90 seconds").

### Levi's lasers – from 20 minutes to 90 seconds

The US-based clothing company Levi Strauss & Co. has patent protection for an automated laser solution for finishing its jeans. The contrast between the previous finishing process and the new one is a striking illustration of the potential of automation.



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**Manual process.** A factory worker has a sample pair of distressed jeans designed by a Levi's designer in hand. To make another pair that resembles the sample, the worker applies chemicals to a basic pair of jeans, uses sandpaper to distress the fabric, and manually makes holes and tears in the jeans. This laborious, inexact process typically takes 20 to 30 minutes per pair.

**Automated process.** A digital image of a pair of distressed jeans, created by a Levi's designer, contains instructions that the company's patented laser technology can decipher. The lasers replicate the design – every faded outline, every rip, and tear – onto a basic pair of jeans. Finishing a pair takes 90 seconds.

The technology allows the company to produce unfinished jeans in Asia, then send them to nearshore countries for finishing. This means that the company can test many different styles, quickly reproduce the best sellers, and have them in stores within days. Levi's is piloting the technology and expects to roll it out to all its factories by 2020.

Additionally, we assessed in more detail the full future automation potential, its financial impact in reducing costs, and the commercial value for companies when automation is enabling near- or onshoring (as exemplified in a denim example). We must acknowledge the speed of change and innovation. Of course, a constant review of technologies and of the core capabilities needed for apparel brands and retailers in the future is needed.

The message is clear: for certain products, automation will not only make nearshoring more attractive for US and European mass-market apparel brands and retailers, but it will also make onshoring to the US economically viable in the future when the technology will be implemented.

### Economic viability of automation

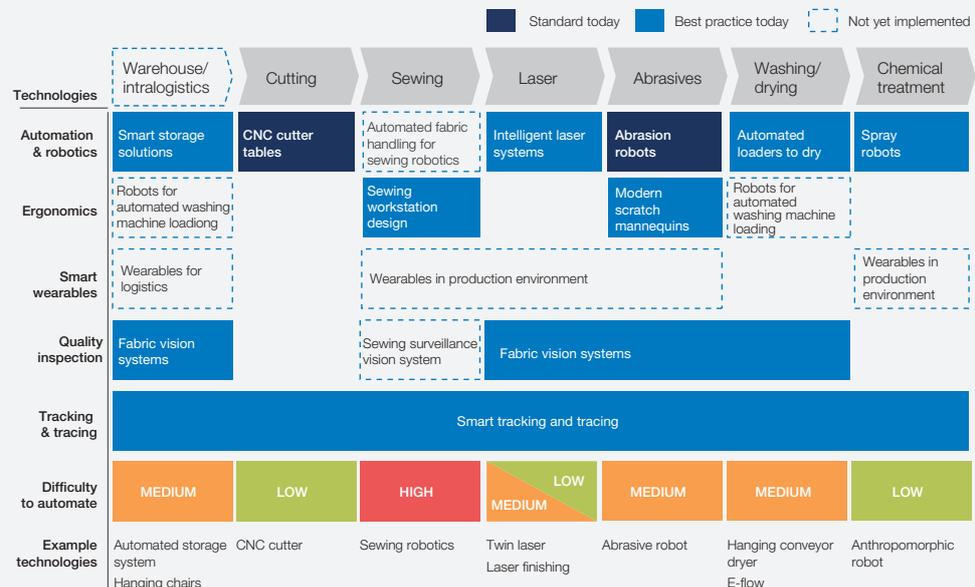
What will automation mean when it comes to the P&L? Based on the financial scenarios for evaluating viability in the prospect of automation in the future, companies should estimate capital expenditures and cost savings for automation technologies throughout the production process and determine the economic implications for different product lines: By how much will a particular technology reduce lead time? What effect will it have on sell-through rates? What investment is required for that technology and how quickly can it be recouped?

Assessment of automation technologies across the cut-make-trim (CMT) and finishing processes of basic jeans, which is one of the products we analyzed, shows just how much the difficulty of automation varies throughout the CMT process (Exhibit 6). In several of the production steps, innovative technologies have not yet been broadly implemented. These provide an indication of the automation potential in the years to come, e.g., robots for automated washing machine loading, support from smart wearables in the production process, or automated fabric handling for sewing robotics.

### Exhibit 6

#### Sewing is the most complex step to automate in the CMT process

Jeans example



Source: Institut für Textiltechnik, RWTH Aachen University; Digital Capability Center Aachen; McKinsey

Assuming that all key technologies currently in development are implemented, about 40 to 70 percent of labor time can be reduced through automation, since the labor time per pair of jeans can be cut from 36 minutes to 20 in a more conservative scenario, or even to 11 minutes in a more optimistic scenario. As sewing accounts for more than half of the labor time in the standard production process of denim trousers, sewing automation will be the biggest driver for reducing labor, accounting for about 21 to 46 percent (Exhibit 7).

## Exhibit 7

### Automation of sewing will be the biggest driver of labor reduction

Jeans example

Scenario 1: conservative  
Scenario 2: optimistic

Labor time per process step, 2017 Minutes (Percent in total) <sup>1</sup>	Potential reduction for process step %	Reduction of total labor %	Key technologies for labor reduction
Sewing 19 (52%)	~40% → ~90% →	~21% ~46%	Semiautomated sewing robotics Sewing robotics
Abrasives 8 (23%)	~50% →	~11%	Abrasive robots Laser finishing
Warehousing/ intralogistics 4 (11%)	~55% →	~6%	Hanging chairs Automated wagon handling
Other steps 5 (14%)	~40% →	~6%	
<b>Total</b>	~36	~44% ~69%	

<sup>1</sup> With implementation of all key technologies currently on the horizon  
Source: Institut für Textiltechnik, RWTH Aachen University; Digital Capability Center Aachen; McKinsey

When translating these time savings into cost savings potential (based on current labor costs) in different production countries, they range from just USD 0.20 in cost savings per pair of jeans in the more conservative automation scenario sourced from Bangladesh, up to USD 14.80 in cost savings per pair in a more optimistic scenario, assuming onshoring production in Germany. Automation of denim production in Turkey, a main nearshoring country for the European market, will achieve cost savings of between USD 1.30 and 2.00 per pair of jeans, whereas automation benefits in lower-cost Mexico, a nearshore market to the US, will fall in the USD 0.60 to 0.90 range.

Therefore, with the automation of manufacturing, nearshoring of denim sourcing to Mexico becomes cost competitive, not just for relocation from China, but even for relocation from low-cost sourcing market Bangladesh. So, from a pure cost perspective, automation levels the playing field and makes Mexico cost competitive with Bangladesh. Even onshoring from China to the US achieves breakeven from a pure cost perspective in the optimistic 70 percent labor time reduction scenario.

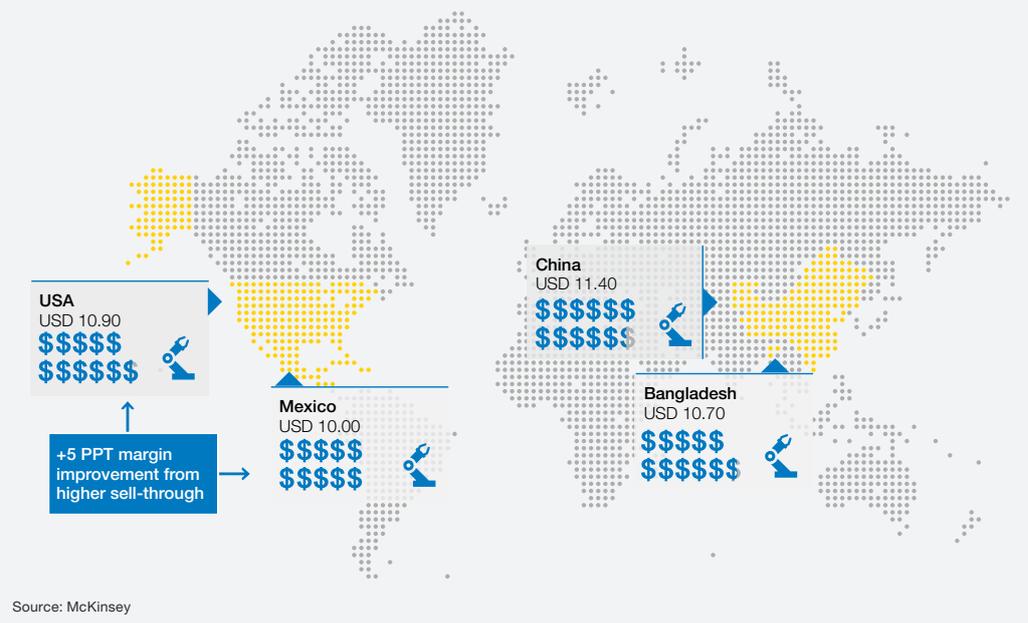
Adding the commercial value from increased speed and flexibility from near- and onshoring to the financial scenario makes an even stronger case for implementing advanced

manufacturing technologies in near- and onshoring markets. With a 5-percentage-point higher sell-through when denim trousers are sourced in a near- or onshoring region, relocation from Bangladesh or China to an automation-enhanced sourcing base in Mexico or the US is economically viable (Exhibit 8).

### Exhibit 8

#### Automation has the potential to make near- and onshoring economically viable by 2025

Production cost per pair of jeans for sale in US market, USD, Optimistic automation scenario with 90% of sewing labor time automated by 2025. Jeans example



For European markets, economic viability of near- or onshoring also improves with automation. For example, moving production from Bangladesh to Turkey and taking into account cost savings and higher sell-through would increase the margin in the current production standard by just 1 percentage point; with additional automation, margin improvements of 3 to 4 percentage points could be achieved. Onshoring to a higher labor cost country such as Germany, however, results in no breakeven in any of the scenarios. Only with even higher sell-through rates and a very optimistic automation scenario would the promise of automation be fulfilled for onshoring to Germany.

Given the high variability of product and design complexity in apparel, a high-level product category perspective (e.g., all denim trousers, all tops) is not sufficient for mass-market apparel brands and retailers to make future sourcing decisions. Thus, this closer look reveals that, despite the benefits resulting from automation and nearshoring for some products, labor-intensive sourcing from offshore countries is not going away anytime soon.

### How quickly can the prospect become reality?

As automation technology continues to evolve, overcomes the current barriers mentioned previously, and becomes more affordable, the economic viability of near- and onshoring by suppliers with advanced manufacturing will improve over time.

Together with the Institut für Textiltechnik, DCC Aachen, and MGI, we analyzed the development in production cost per item that will take place in Asia, leading US and European nearshore markets, the US, and Germany in the next few years as further automation technologies are implemented.

In our survey related to this work, 82 percent of respondents believe that simple garments will be fully automated, affecting an 80 percent labor reduction by 2025. 70 percent think that it is highly/somewhat likely that more complex garments, such as dresses and jackets, will be significantly automated (resulting in a 40-percent labor reduction).

Within five years, semi-automated factories could enable nearshoring and selected lighthouse projects of new business models, such as store factories, which could help build customer excitement. Within five to ten years, suppliers with fully automated factories could enable full onshoring. More complex silhouettes will be semi-automated within a decade and to such a degree that companies can scale up new, high-margin business models that include customization.

As the earlier analysis on nearshoring breakeven and the economic viability of automation demonstrated, near- and onshoring for the US market will help achieve greater benefits, even from a pure labor cost perspective. In comparison, the nearshore opportunity will become attractive for European apparel mass-market brands and retailers, while onshoring – to the high labor cost Western European markets especially – will remain more evasive.

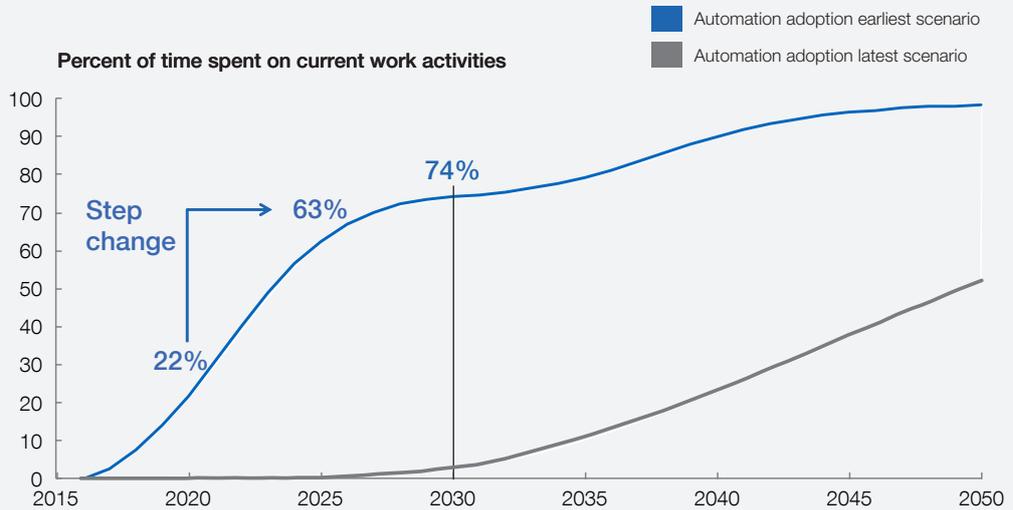
However, beyond technical feasibility, cost savings, and the commercial value- generation potential of automation, there are other factors that will impact the rate of adoption in apparel manufacturing. Therefore, the scenario methodology used by the MGI<sup>8</sup> includes the time required to develop capabilities, labor supply and demand dynamics, regulatory considerations, and social acceptance, among other factors. Based on this perspective, the adoption of automation in US apparel manufacturing has the potential for a real step change development before 2025, when the adoption rate of automation is expected to reach up to 63 percent in an earliest scenario model (Exhibit 9).

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<sup>8</sup> A future that works: Automation, employment, and productivity, McKinsey Global Institute, January 2017. [www.mckinsey.com/featured-insights/digital-disruption/harnessing-automation-for-a-future-that-works](http://www.mckinsey.com/featured-insights/digital-disruption/harnessing-automation-for-a-future-that-works)

### Exhibit 9

Pace of automation adoption in the US garment industry could reach up to 63% by 2025 and 75% by 2030



Source: Interviews with experts; BLS; O\*NET; FDI Benchmarks, Oxford Economics United Nations Population Division; McKinsey Global Institute analysis A future that works

Looking at the trajectory of automation technologies and adoption, mass apparel brands and retailers should by no means lean back and wait for the further advancement of innovations. On the contrary, they should embark on the journey toward a demand-focused value chain now or they could risk losing touch with their consumers in the not-too-distant future.

**The automation journey**

Recognizing that the apparel sector is lagging far behind when it comes to automation, apparel players can learn from the automation journeys of more advanced sectors. Looking at the installed base of industry robots in first-mover industries such as automotive, for example, the installed base is nearly seven times higher; in electronics, it is nearly four times higher than in apparel.

We looked into the automotive industry, an early mover in the 1980s, to exemplify the first automation horizon. The second horizon of the automation journey was exemplified by assembly in electronics, which started in the mid-1990s. Mass-market apparel brands and retailers can also take inspiration from more recent disrupters, such as retail giant Amazon, which has harnessed the power of technology to create a sustainable competitive advantage.<sup>9</sup> Amazon invests ahead of the curve – even before technologies are economically beneficial – and reaps the benefits down the road. For example, through its acquisition of robot maker Kiva Systems, Amazon can operate as many as 10,000 robots in a single warehouse – or about ten times the number of robots at its key competitors’ warehouses. Amazon’s other recent automation experiments include drone delivery, which the company is piloting in the UK and US markets, and its no-checkout stores called Amazon Go. In conducting this analysis of development horizons, there are six themes that emerge from which the apparel sector can learn (Exhibit 10).

**Exhibit 10**

Learning from other industries	As exemplified by	Horizon
1. <b>Technology is developing rapidly</b> and, becoming cheaper and more efficient	Robot price development vs. that of labor Robot adoption in China	<b>1980-1995</b> • <b>1995-2010</b> • <b>2010</b> Welding & paint in automotive  Assembly in electronics  Warehouse automation for Amazon  
2. Automation is evolving <b>from a cost/quality focus to be more of a business innovation</b>	<b>Amazon</b> supply chain innovation	<b>2010</b> Warehouse automation for Amazon  
3. <b>Advances in other industries in areas relevant to apparel</b> (gripping, vision, cobots, AGVs)	<b>Amazon</b> picking challenge	<b>2010</b> Warehouse automation for Amazon  
4. Approach could be to automate <b>current steps or fully reinvent the current process</b>	<b>KIVA robots</b> bringing the shelf to the picker	<b>2010</b> Warehouse automation for Amazon  
5. <b>Manufacturers will likely not push the agenda alone</b> – “old” mindsets and behaviors are substantial barriers	<b>Electronics manufacturer</b> moving a TV line to the US	<b>1995-2010</b> Assembly in electronics 
6. <b>Dynamics between brands and manufacturers</b> have varied among industries	<b>Mix of dynamics</b> in automotive, electronics, and e-commerce warehousing	<b>1980-1995</b> • <b>1995-2010</b> • <b>2010</b> Welding & paint in automotive  Assembly in electronics  Warehouse automation for Amazon  

<sup>9</sup> www.amazonrobotics.com

# Embarking on the journey

The assertive automation approach some players are taking serves as an example for any apparel player that is not content to be a follower, but instead wants to generate first-mover advantage.

In order to position themselves for success in the coming decade, mass-market apparel brands and retailers need to consider four actions when rethinking their future supply chain with regard to nearshoring and automation: modeling financial scenarios to define the future sourcing and production strategy, nurturing new skills and capabilities, building an ecosystem of partnerships, and roll up your sleeves and dig in to accelerate the learning curve.

## **Defining the future sourcing and production strategy**

Knowing where they want to go and how to get there will be crucial for mass-market apparel brands and retailers. In their quest for an on-demand supply chain, they should model different financial scenarios that allow them to develop a quantified fact base for use as guidance in their strategy. This modeling should consist of three different elements.

One element involves estimating the potential value of improved speed to market and doing so for various product lines. The value of speed- to market will be derived from factors such as higher full-price realization, lower inventory levels, and increased sales. Increased sales will be generated by responding more quickly to trends, generating the ability to test more styles (test-and-scale), avoiding early sellout on successful styles, and reducing cannibalization and brand dilution through markdowns. In the long run, this will also strengthen the overall brand position.

The value of improved time to market will vary between brands and different product lines – highly seasonal and trendy items will benefit much more than will basic garments. Brands should analyze historical data and look at volatility, sell-through rates, and markdowns for different product categories in order to develop an informed picture of the impact that improved speed could have.

Once the impact of speed is estimated, the next element should be to understand the cost implication and feasibility of nearshoring for different product types. A robust cost baseline should be built for production in different countries based on labor time (for the garment in question), labor cost and productivity (for different countries), tariffs, logistics costs, etc. With this cost baseline established, an assessment of feasibility to manufacture various product types in different countries should also be conducted, including a perspective on current manufacturing capabilities and access to fabric. Several factors in this assessment like productivity, manufacturing capabilities, and access to fabrics should be viewed as influenceable, since pioneering apparel companies will invest in improving them.

Having identified the value of time to market and cost baseline, they should now be integrated into an overall view of the economics of nearshoring. Brands should then augment this with different scenarios of automation.

What is interesting is that once automation has overcome the current technical barriers, nearshoring and automation will not make financial sense for every single apparel brand's or

retailer's product going forward. Decisions regarding the future production footprint of each product type should be based on two main criteria: the feasibility of nearshoring and the commercial value of reducing lead times.

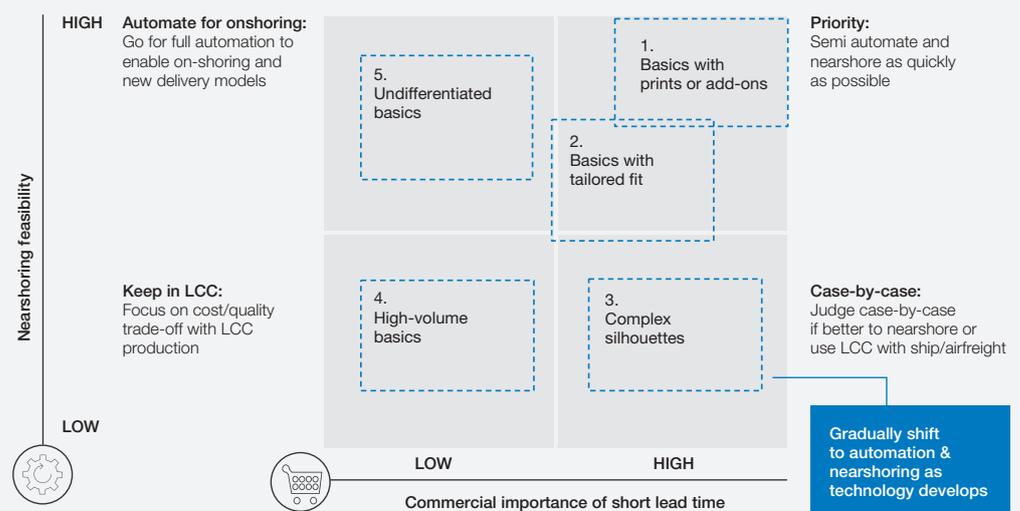
The variation of labor intensity and automation difficulty – two key factors impacting nearshoring feasibility – vary greatly between different product and design types. The differences for both are mainly driven by the same characteristics, for instance, number of pieces, finishing and intricate details, movement of parts, and type of raw materials. Product lifecycles and degree of fashionability are key differentiators impacting commercial importance of short lead times and agility for higher sell-through rates and increased sales.

Taking these factors into account when classifying product into design types helps mass-market apparel brands and retailers establish a high-level view of what the future holds when it comes to the sourcing and production footprint: Which items should be sourced nearshore? What type of products can be onshored? For which items is (semi-) automation crucial in achieving the best economic result in terms of cost and sell-through? Which designs are most likely to be sourced from low-cost countries now and in the future?

In the case of woven and jersey tops, we grouped products into five design types, such as the typical never-out-of-stock basic white T-shirt in one category and a fashionable print T-shirt in another (Exhibit 11). The decision map provides guidance regarding the sourcing and supply chain strategy, showing, for instance, where the undifferentiated basics could be sourced in an onshoring model when production is fully automated.

### Exhibit 11

Priority items to automate and nearshore are basics differentiated through print, add-ons, or tailored fit; complex silhouettes will follow



Source: McKinsey

Looking ahead, leading apparel players will use automation not only to boost sell-through and cut costs, but also to achieve breakthroughs in commercial innovation. Of the survey respondents, 80 percent indicated that it is likely/highly likely that the contribution of automation to making new business models (e.g., the opportunity for customization of style or fit) will be a major growth driver for mass-market apparel brands and retailers.

Although not all automation technologies are currently implemented, using the decision map to segment the assortment helps mass-market apparel brands and retailers identify the areas in which they will need to focus their supply chain transformation and what types of capacities, skills, and partnerships they should build to help them be successful in shifting from a supply to a demand focus. Ensuring the skills and mindsets needed will be a decisive factor in players being prepared to act in the future. This will require the appropriate development of existing talent within the companies as well as dynamic efforts to attract external talent.

### **Developing new skills and changing mindsets**

As in a number of industries, access to talent will be a major success factor in achieving the supply chain of the future. The biggest talent gap today is likely in digital/advanced manufacturing and managing intelligent sourcing decisions in the more complex apparel value chain.

Taking employees on the journey from the “old” to the “new” sourcing world will be key in this context. Successful players do not hesitate in starting the process and building in-house expertise on the go. Recruiting talent in this area will require apparel companies to develop an appealing employee value proposition. Companies should also not overlook senior talent who possess vast experience from having worked in other industries. Employees with the best and most extensive understanding of the engineering behind both existing and future-based technologies are equally as important as the technologies themselves.

The main task for companies will likely be to stay at the forefront of industrywide developments and decide on where to invest (e.g., forming partnerships/making acquisitions, or having the in-house talent to develop new technologies themselves). Either way, it is important to have the people who are able to develop or identify winning technologies.

Furthermore, the complexity of a mixed-sourcing approach setup for speed is much higher than an Asia-focused approach, which is optimized for cost and large batch sizes. At the same time, collaboration with suppliers is becoming more important. Companies may already have the right staff in place to handle this; if not, a step-up in analytical and managerial capabilities as well as relationship management is needed.

In addition to building their own digital manufacturing knowledge and intelligent sourcing capabilities, it will be tough to find the people who are familiar enough with the current situation and who know how to scale up sourcing operations and expand capabilities in

newer, less developed regions. An effort to develop this kind of talent should be placed high on the agenda. Collaboration with governments and local industry associations will be key to enabling the development of new manufacturing clusters.

Building skills and changing mindsets will be critical for a successful transformation. The technological opportunities from automation and digitization and the need for speed on rethinking the entire apparel value chain requires a very different, much more consumer-focused and agile approach. For the last several decades, the apparel sourcing industry operated with the mindset of squeezing suppliers and constantly searching for the next FOB (free-on-board) reduction opportunity and cheaper country. As players will not be able to go it alone in the future, it will be important to shift mindsets when it comes to building an ecosystem of partnerships.

### **Building a new ecosystem of partnerships**

Partnerships will be key in building a sustainable competitive advantage in the context of uncertainty regarding winning technologies and a high-paced speed of innovation. Apparel brands and retailers will need to forge relationships with several different types of entities.

For one, they will need to partner with global megasuppliers in order to build manufacturing capacity and capabilities in new geographies. As 75 percent of survey respondents believe that automation will further accelerate supplier consolidation by 2025, now is the time to be forming partnerships. This is an opportunity for established Asian manufacturers to be trailblazers and organize the automation of the industry in the near- and onshore regions. Companies should choose strategic manufacturing partnerships based partly on how advanced the manufacturers are with regard to automation and also on their experience in setting up production in frontier markets while ensuring productivity, quality, and sustainability. A fundamental shift away from the historically transactional and cost-focused supplier relationship is needed.

To be able to stay at the forefront, brands will also need to collaborate with technology companies to develop innovative automation solutions since, currently, neither apparel brands nor (most) manufacturers are likely best positioned to develop disruptive technologies. According to nearly 80 percent of survey respondents, access to advanced manufacturing and the respective intellectual property will become a competitive advantage. Companies need to decide on their path to achieve this and partnerships will, in our view, play a key role here. Mass-market apparel brands and retailers with the financial wherewithal to invest in technology firms should definitely consider doing so. For example, Walmart has invested in technology company SoftWear Automation to allow it to stay on top of their development in sewing automation.

Financial partners – such as private equity (PE) or venture capital firms – can also play a critical role in the ecosystem of partnerships. For one, they can be involved in the investments in technology companies. But maybe even more importantly, they could play a crucial role in making capital investments to enable local end-to-end supply chains in frontier nearshore countries.

As mentioned previously, much of the fabric production has followed garment manufacturing and is thus concentrated in China. Boosting capacity for fabric production in Eastern Europe and Central America will require large capital investments in fabric mills. It is likely that most apparel brands will not want to tie up capital in that part of the supply chain. Therefore, establishing partnerships with, for instance, PE firms to drive investment in fabric production in these regions could be a way to enable an end-to-end supply chain in new geographies (which will be needed for speed). Engaging in coalitions with other stakeholders to drive investment and make other brands and retailers commit to certain volumes should also play a part in the partnership ecosystem. There is potentially a great deal to gain and many bold moves that players can take to position themselves in the industry's new tomorrow.

### **Taking the first step**

Mass-market apparel players that aim to win tomorrow should have started yesterday. The strategy will differ for those players that aspire – and need to aspire – to be globally leading based on scale and importance of speed in their overall business model. Others that are smaller and for which speed is less critical will still be safe by taking a follower approach. However, the future apparel manufacturing and sourcing footprint will be more differentiated.

There are many things that players can already act on now and the riskiest strategy to follow is to simply wait for new technologies to emerge. For the transformation of the apparel value chain – as with any digital transformation – there is no such thing as a correct long-term strategy derived from facts. Rather, the pace of innovation and change in consumer behavior require an approach that sets a direction and then applies an agile approach of testing and learning as well as solving issues on the go. Hence, companies need to be bold and take the first steps, pick up the pace and get going, and handle situations as they arise.

Some companies today use flying as a shortcut to achieve the speed of nearshoring called. Players use this strategy to start developing the commercial engine that fully leverages short lead times. That entails improving their in-season trendspotting (monitoring social media, frequenting trendy locales, sourcing trend information from store staff, etc.), radically tweaking the batch size and inventory strategy to embrace test-and-scale and in-season replenishment, and also adjusting pricing, promotions, markdown, and marketing tactics. Of course, a rapid product design and development cycle will enable fully executing these actions (especially the trend-action part), but they should already be a priority for any fashion player. Emulating a fast supply chain to develop the commercial engine will not only enable brands to use nearshoring, it will also help quantify the value of speed to enable more fact-based decision making. However, flying is neither sustainable from an economic nor environmental perspective. Nearshoring and automation will be key in building up a more sustainable, circular value chain.

Starting the nearshoring journey now rather than waiting for automation to further improve the economics is critical in leapfrogging the competition. Based on the financial scenarios modeled, it should already make sense to nearshore some product lines and categories if the value of speed is what is being considered. Even for product lines that are not yet economically favorable, it could be a worthwhile investment for brands to make a slightly lower profit in order to gain an edge on competitors. Nearshoring for speed and sustainability will not be an easy endeavor. Companies need to solve issues in

manufacturing capabilities and scale and also have quick access to fabric, manage a more complex sourcing setup, implement “design-to-speed” thinking (i.e., adjusting design so that it is possible to produce garments quickly given fabric availability and the manufacturing process), and create a commercial engine to capitalize on speed. Being far ahead on this learning curve could provide an advantage that will be difficult for competitors to top.

In addition, apparel companies should not be passive when it comes to automation technologies. They should go out and place several bets, e.g., collaborate with manufacturers, invest in technology firms, and recruit talent for in-house engineering. Technological advancement (e.g., in gripping technology, robotic vision, cobots) has pushed automation in apparel manufacturing to the brink of a breakthrough, and putting “rubber to the road” in the form of investments could very soon lead to a disruption. Apparel companies that are active in driving the development should expect to see great returns on their investments.



Rampant industrywide change demands decisive action. The supply chain has rarely been the main topics apparel CEOs think about. Although it is the engine that needs to run smoothly to ensure good service levels and margins, it is not seen as the primary source of growth and winning in the fierce apparel market.

But this will change. The disruptions ahead are so profound that mass-market apparel players making big moves and capturing the advantages of nearshoring and automation have the opportunity to build business models that drive growth and are hard for others to replicate. Although apparel manufacturing may not be coming home in the near future, some of the production will be at least moving ever closer – and mass-market apparel brands and retailers will want to be prepared.

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