Soko Jewelry, Fast Fashion, and Building a Virtual Factory
Anna Waldman-Brown and Georgina Campbell Flatter

“Fashion is about dreaming and making other people dream.”

– Donatella Versace, fashion designer

“Soko saved my life.”

– Veronicah Rachiedo, Soko artisan

Ella Peinovich sat under a guava tree in her backyard in Nairobi, Kenya, looking out at the skyscrapers just visible over her fence. Her husband and young son had picked most of the guavas, but she still managed to find a ripe fruit which she munched on now, lost in thought. It was the summer of 2017 and Peinovich, CEO and co-founder of the ethical manufacturing platform Soko, was reflecting on how her company would position itself for future growth. Peinovich considered the difference that her company had already made in the lives of jewelry artisans across Kenya as she rubbed her fingers along her brass necklace.

Soko was a medium-sized fashion company (under US$10 million) producing brass, horn, and bone jewelry for mid-tier customers worldwide. It had an average compound annual growth rate (CAGR) of 92% between 2014 and 2017, 60 full-time employees, and 2,300 artisans throughout Kenya who manufactured jewelry on a contract basis—and Soko’s revenue had been doubling year-over-year since 2014. The firm was not yet profitable, but had very healthy margins on jewelry production, and Peinovich’s team was confident that they would break even in the next several years. Peinovich was especially proud of the fact that her artisans retained 20% of overall revenue, as compared to the industry standard of only 5–10%—with the exception of highly trained 3D-printed jewelry technicians who capture around 40% of overall revenue as full-time factory employees, but these technicians do not own their tools (see Figure 1 below).1 Soko’s artisans

1 Personal phone interviews with jewelry supply chain consultant, John Croston, and founder of Au Enterprises, Linus Drogs, January 2018.
captured roughly the same percentage of revenue per item of jewelry as fair trade artisans,\(^2\) though they were able to sell more jewelry through Soko due to its seasonal fashion changes (see the “Staying Competitive in a Crowded Market Segment” section below).

**Figure 1: Approximate worker revenue as percentage of company revenue**

![Diagram showing approximate artisan revenue as percentage of company revenue.](image)

Many of Soko’s artisanal suppliers received roughly a 5x increase in annual income after becoming contractors for Soko. “They’ve gone from a handful of products by the side of the road every day,” said Peinovich, “to now hundreds of products in retail shops around the world.” Most importantly, Peinovich explained how Soko was also contributing to social mobility:

> We see a number of people moving out of the slums. They are paying their dowries for the first time, paying the school fees for their boys and their girls, and putting three meals on the table every day. This is a huge point of pride, because we at Soko really believe that we are helping artisans to lift themselves out of poverty.

Despite her success, however, Peinovich was dissatisfied with the state of her business that summer. Results from an impact analysis last year indicated that Soko’s *impact*, indicated by artisans’ overall share of Soko’s revenue, had decreased from 2014 to 2016 as increasing overhead costs of sales, marketing, and other key business expenses cut into artisans’ revenue:

An additional challenge to Soko’s intended impact, the majority of Soko-generated gains were captured by the 20% of Soko artisans who worked full-time, while the rest of the firm’s artisans worked part-time and 20–40% of artisans in any given quarter were inactive. Although these artisans worked for other jewelry companies or practiced in other trades, nearly all had expressed an interest in working full-time for Soko.

Could Soko provide all its artisans with a decent share of revenue, or would the firm have to shift its business model in order to actually become profitable? From Peinovich’s point of view, a shift away from supporting artisans would decrease Soko’s overall effectiveness as an ethical producer—was this the only way for Soko to compete with modern technologies and assembly-line factories?

The company’s unit growth had mostly leveled out, and the increase in revenue was partially due to increased prices and better organization, rather than an increase in sales. Soko’s current demand had not allowed them to substantially increase jewelry production, better utilize their current artisans, or even bring new artisans into their network without diluting the overall amount of work. If Soko’s innovative virtual factory model hoped to globally disrupt the fashion market—which, after all, was the ultimate mission of Peinovich and her team—then the company would need a new strategy to scale up production.

Peinovich furrowed her brow, wondering whether she had saturated her current market segment of fashion-conscious millennials in Europe and North America. An even bigger challenge was that 40% of Soko’s sales took place in the last quarter of the year for the holiday season, and Soko’s overall production capacity for the rest of the year was sorely underutilized, at around 35%. If Soko’s suppliers had consistently spent half their capacity working for Soko throughout 2017, the company could have increased its revenue by a factor of five.

So, Peinovich mused, what should be the next step for Soko? Should she continue to sell jewelry to her current market segment of socially conscious consumers, or would it make more sense to diversify her product offering and/or her customer base? Most importantly, how could Peinovich’s
team scale up without sacrificing their mission to provide both livelihoods for their artisanal suppliers and elegant products for their customers?

**Ella Peinovich’s Story**

As far back as Ella Peinovich could remember, her primary passions in life had been art, creative problem-solving, and social impact. As an architect and designer by trade, Peinovich grew up in an artists’ colony in Wisconsin. Engagement with her church brought her on several mission trips and Habitat for Humanity excursions to work with under-resourced Native American communities and rural towns in Montana, West Virginia, and Colorado. These trips focused on public service projects such as helping the visually impaired and rehabilitating natural landscapes—which led to the realization that she could harness the power of design to “organize creative thought” and generate systemic, lasting impact for underprivileged communities.

“Art and math were my favorite subjects in school,” Peinovich recalled, so she found architecture to be a natural fit. She graduated with a Bachelor in Architecture from the University of Wisconsin–Milwaukee, then joined a corporate architecture firm as a designer. But Peinovich had grown up with the idea that art and design could be powerful forces for change, and she grew dissatisfied with corporate life after three years. She enrolled at MIT to pursue a Master of Architecture. There, a digital fabrication course and a class on design thinking further motivated Peinovich to apply her design expertise toward “disruptive scale and impact.” In her first year of graduate studies, she also joined the urban sanitation startup Sanergy, which provided toilets to slum communities in Nairobi, Kenya, then processed the resulting sewage into fertilizer products for farmers to subsidize the costs of toilets and sewage collection. As Sanergy’s first architect, Peinovich helped to design the actual toilet stalls.

Peinovich loved her first trip to Nairobi, which was also her first time visiting the African continent. She also realized that even though designing toilets satisfied her love of impact, it would never satisfy her love of art. Visiting craft markets around Nairobi, she was astounded by the brass craftsmanship of local artisans. She started purchasing suitcases full of jewelry to sell in her family’s art gallery back in Wisconsin, and was successful enough to cover her airfare and turn a small profit.

Back at MIT, Peinovich was writing her master’s thesis on “Localized Design-Manufacture for Developing Countries.” She investigated methodologies for fostering entrepreneurship among informal artisans by introducing new technologies such as friction-fit molds, fiberglass forms, and molding/casting technologies. The following year, she returned to Nairobi with Sanergy while continuing to explore her interest in art and design. Peinovich was running a workshop on design for development at the University of Nairobi—introducing 3D modeling and digital fabrication to students—when she met Catherine Mahugu, a Kenyan software engineer. Peinovich and Mahugu began discussing the idea of building a platform for Kenyan jewelry makers to sell their wares on the international market. They developed a proof of concept for what Peinovich called an “Etsy for Africa” mobile app, which quickly gained interest with the artisanal community.

During a later visit to Nairobi, Peinovich was invited to speak at New View, a high school program implementing technology in slum communities. Her talk impressed Gwendolyn Floyd, an
American industrial designer who was teaching at the school, and the two women quickly became friends. Peinovich then brought Mahugu and Floyd together to discuss how they might work together to build upon Peinovich and Mahugu’s app.

Throughout Peinovich’s time at MIT, the three co-founders continued to develop their startup which combined Peinovich’s three passions: art, technology, and social impact. As Floyd put it, Soko “was born out of a love of design, the combining of global perspectives, the desire to connect and empower entrepreneurs using technology, and the belief that women can change the world.”

Building upon Mahugu’s proof of concept, the company Soko emerged as an effort to bring state-of-the-art technology and a global market to cottage industries. Soko’s team joined a three-month startup accelerator for MIT students called delta v, which helped them get off the ground and find investors.

Kenya’s Artisanal Industries

The Informal Craft Sector

The global craft sector, comprised almost exclusively of “informal” enterprises, is the second largest source of jobs in emerging markets. Peinovich explained, “The artisanal sector produces about 60% of the creative goods globally, and yet about 70% of this population are just outside of digital connectivity so they don’t have the access to be able to sell on eBay, or Amazon, or their own web store.”

Characteristics of “informality” may include operating out of households rather than dedicated shops or facilities, a lack of connections to established businesses, a failure to go through official routes for legal registration, and a general avoidance of business taxes. Across sectors, such informal enterprises make up about 90% of micro and small businesses worldwide, and up to 75% of non-agricultural jobs in emerging markets.

Despite its predominance, few people actively choose to work in the informal sector. Wages tend to be low, and there are few unions or other workers’ organizations with any power. Informal businesses are also subject to exploitation, accidents, and unreliable supply chains, and there are few mechanisms for legal protections or insuring one’s property. Due to the small scale of most informal firms, as well as the general lack of literacy and education, informal workers have difficulty procuring loans and expanding their businesses, so most enterprises tend to focus on local needs. Such an environment leads to highly variable profits and constant stress, and most informal workers must hold several different jobs at once to make ends meet. These unfavorable conditions explain why informal firms are only about 25% as productive as small formal firms overall.

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3 FEED, “Behind the Scenes with Soko,” FEED (blog), unknown date.
5 Ibid.
The Kenyan National Bureau of Statistics estimates that the informal sector accounted for 83% of Kenya’s employment in 2016, employing around 13.3 million people. Out of 832,900 new jobs created in Kenya in 2016, a full 747,300 of those jobs were created in the informal sector. That year, 2.7 million Kenyans worked in the informal manufacturing sector, including 0.5 million craftspeople, comprising the second-largest workforce after agriculture.\(^7\)

The breadth of the global informal economy could provide a massive, untapped opportunity for the local processing of raw materials as well as the production of finished goods, on both domestic and international scales. Despite a dearth of full-time employment opportunities, formal jobs remain the ultimate goal for many informal workers across emerging markets; informal artisans lack social services and many other forms of support, and full-time jobs tend to be more socially prestigious. While networks of informal firms will never substitute for large-scale infrastructure development, Soko’s virtual factory would demonstrate that the informal craft sector could become integral to a new model for inclusive industrialization. “Many [jewelry] artisans are micro-entrepreneurs,” said Peinovich, “living on less than US$2 a day, and working for that day to put a meal on the table.”

Like most workers in the informal industrial sector, Kenya’s jewelry artisans had historically lacked the resources necessary to innovate on their own. According to Peinovich, Nairobi lore held that one man named George launched the metal-casting industry across Kenya, building furnaces and torch equipment with local materials, and the knowledge had since spread through apprenticeships and informal knowledge sharing. However, that had been decades ago.

More recently, around 1998, a collaboration between the Italian non-governmental organization (NGO) Terra Nuova and the University of Nairobi revealed that water pumps could be retrofitted into grinding machines. This led to a government-supported training program that introduced precision horn and bone work to Kenyan artisans, who, up until that time, had used machetes and other crude tools to shape their jewelry.\(^8\)

By 2017, artisans were still purchasing water pumps and hiring local metal workers to convert them into grinding machines. Terra Nuova had since moved on to other initiatives, however, and innovation among jewelry artisans had mostly stagnated. To further upgrade their skills and techniques, especially to meet the demands of international clients, they would need a new intervention.

While individual microfactories may have lacked the financial incentives to upgrade on their own, an aggregating company like Soko could deliver benefits via the collective improvement of all suppliers. Thus, Soko was able to provide the expertise and organization needed to keep its suppliers globally competitive, and all its artisans reaped the benefits.

Policy incentives for manufacturing and small business development played a significant role in supporting, or discouraging, local production. The more that businesses saw value in informal-sector firms, the more local policymakers might pay attention to the possibilities. The government of Kenya had several legal structures in place to support small businesses; but their current “small


\(^8\) “Our Story,” Terra Nuova, 2015.
and medium enterprise” category required a minimum of 15 full-time employees, so Soko did not initially qualify. Peinovich admitted that Kenyan startups preferred “to remain under the radar” for as long as possible, and in 2015 it was “practically impossible” for a Kenyan startup to get its paperwork correct the first time. Indeed, Peinovich had to hire a tax attorney to deal with the bureaucracy of Kenya’s accounting scheme for locally manufactured products—and then she needed to navigate import/export regulatory systems both in Kenya and in Soko’s countries of import. In contrast, the US African Growth and Opportunity Act reduced the taxes of some imported products from certain African countries by 25%, and even eliminated some taxes altogether. These tax cuts played a key role in helping Soko to reach the American market.

Networked Craft Production

One historical example of Soko-style networking across cottage industries was the practice of “putting out,” in which a large manufacturer delegated work to a number of geographically distributed artisanal workshops. Although most decentralized production along these lines had disappeared with the advent of the Industrial Revolution, select industries found putting out to be competitive with traditional mass production in certain regions. The Italian knitwear industry in the 1990s, for example, was one case in which contracting to microfactories provided higher overall profits for clothing manufacturers than traditional mass production. Production-rate asymmetries in various stages of knitwear manufacturing naturally led to substantial inventory costs for large factories, giving an advantage to the microfactories that produced their wares just in time.9

Indeed, networked craft production maintained several advantages over traditional large-volume production: minimal inventory, low upfront capital costs, the ability to utilize existing microfactories rather than build new facilities, the creation of local employment and expertise, increased factory agility, and potential savings on transportation costs. Upholding traditional rural industries could also help to mitigate unsustainable urban migration by providing more jobs in disenfranchised regions. As indicated by the high-end local food movement across the United States and Europe, some consumers were demonstrably willing to pay a premium for ethically produced and/or locally made goods. Although Soko’s artisans used only manual tools, Soko’s production model bore similarities to the supposed promise of distributed microfactories employing on-demand 3D printing and CNC machining.

Most importantly for emerging markets, networked craft production did not require the extensive infrastructure needed for traditional industrialization. “We can aggregate small-batch production into high volume,” Peinovich said, “and this allows us to compete in mainstream consumer fashion markets.”

Just as Bangladesh “leapfrogged” landline telecommunications networks by jumping straight to infrastructure-light mobile phones, some foresaw a similar trend for manufacturing. Why would emerging markets—which already suffered from costly and convoluted supply chain logistics—burden themselves with the outdated infrastructure of traditional, high-volume manufacturing in sectors where distributed production could be equally competitive? Soko’s model offered a more

inclusive and sustainable manufacturing paradigm for sectors that did not benefit from traditional economies of scale: specialized components like airplane engines, customized or on-demand products such as medical devices, and labor-intensive handicrafts like jewelry and apparel.10

Soko V1: Etsy for Africa

Soko began as a simple platform for informal jewelry artisans in Kenya to sell their own products on the international marketplace—an Etsy.com with additional marketing support for Kenya’s less technically savvy informal sector. While Peinovich and Mahugu built the mobile-to-web marketing platform, Floyd curated a high-quality selection of jewelry sourced from artisans around Nairobi. This platform became a virtual marketplace for informal artisans to sell their goods directly to international consumers, so artisans wouldn’t have to rely upon locals, tourists, and middlemen.

Unexpectedly, Soko’s team found themselves unable to consistently grow sales for their products after six months—and, as with many marketplace solutions, Peinovich struggled to properly manage everyone’s expectations. None of the co-founders had ever run a retail business, and Soko’s early days involved many challenges. The team knew how to find and market excellent products, but they lacked a sustainable business solution to reach profitability. They realized that they were solving the wrong problem: Connecting Kenyan artisans to international markets would never be enough, since the key challenge for artisans was the fact that they didn’t know what international customers wanted to buy.

After exhausting their market of friends and family, Soko’s team had to come to terms with their stagnating sales. They initially expected that wealthy North Americans and Europeans would be willing to pay far more than Kenya’s local market for handicrafts, but Soko’s estimated price of its handmade goods and the actual price that customers were willing to pay (given the proliferation of similar machine-made goods) were, in Peinovich’s words, “completely misaligned.” As she discovered through this failed Etsy model, it was very difficult to sell large volumes of diverse products—especially when the artisans creating these products had little exposure to international trends, no concept of foreign customer preferences, and no experience with quality control standards. Every item in Soko’s online store turned out differently, and traditional Kenyan designs were not always attractive to young, fashion-conscious consumers.

In other words, Soko’s Etsy for Africa would never amount to a profitable business. Peinovich, Mahugu, and Floyd applied their design expertise to the problem and, after several harrowing brainstorming sessions, they pivoted toward developing their own fashion brand rather than relying upon local artisans as designers. Peinovich explained, “There’s a spectrum: At the far end you have art, one-of-a-kind individual pieces [Soko V1]. Soko [V2] is somewhere between art and small-scale manufactured products… Can we meet the volumes that we’re seeing in retailers?”

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Soko V2: Creating a fashion brand

Soko’s team never set out to develop a revolutionary production model, but they were not going to waste an opportunity. “It’s not just simply product being sold to customers,” said Peinovich. “There’s an entire value chain, an entire ecosystem that frankly we had to develop in order to make Soko successful. But we did not start there.”

Soko’s co-founders always knew that their ultimate goal was large-scale distribution and competition with major fashion brands; they did not intend to limit themselves to local craft markets or niche fair trade companies, but they were unsure of how to stay competitive while employing informal artisans. Peinovich’s passion for problem-solving eventually led Soko’s team to revive a pre-industrial model of geographically distributed production, with the addition of modern networking technology and smart algorithms to select the right artisans for the right jobs.

Soko’s eventual business model matched talented artisans with both an international marketplace and highly competitive jewelry designs. Since Soko began with a strong commitment to supporting existing brass artisans, the co-founders wanted to leverage their current ecosystem of skilled jewelry artisans rather than build their own infrastructure or train unskilled workers. This also allowed them to save on capital costs by contracting out to existing microfactories rather than building their own factory. Nonetheless, as befits a new production model, Soko had to invent its own manufacturing system. Peinovich said, “We’re building the next-generation supply chain: more distributed, more agile, and more ethical. I see this as a necessary step in revolutionizing retail and the fashion space as we see it today.”

Many fashion manufacturers viewed cottage industries as a potential liability in their supply chains, due to a long history of factories outsourcing handicraft production (especially beadwork and embroidery) to informal-sector subcontractors at exploitative rates. Peinovich, however, saw these informal cottage industries as a potential asset. Soko eliminated middlemen through vertical integration and direct interactions with suppliers, and further trained artisans so they were able to earn above-market wages by manufacturing jewelry for a discerning global audience. Soko’s business model turned semi-skilled informal artisans into highly skilled manufacturers for the global jewelry market, providing them with the skills and resources to compete with the formal sector on their own terms. “Formalization,” said Peinovich, “is not the answer. Rather, networked infrastructure will bring progress.” Indeed, Soko’s virtual factory model of networked craft production combined the scale, efficiency, and collective intelligence of high-volume manufacturing with the benefit to local economies provided by small, artisanal businesses. Peinovich explained:

We really asked ourselves: With the way that the retail sector is going and consumption is leading us down this fast fashion path, the way that artisans are really marginalized due to access, not talent, what if fashion and consumerism could work for the poor rather than against it? At Soko, we believe that we can enable human capital through the use of technology. And this is in contrast to mass manufacturing, where technology is automating people out of the supply chain. We at Soko believe that humans are our best asset!

11 “Standards for Ethical Compliance in Homes and Small Workshops,” Nest, December 2017.
The technical innovation behind Soko’s operations, and its key piece of intellectual property, was its mobile-to-web virtual resource planner (VRP), which allowed for the coordination of its massively decentralized supply chain with minimum variability.

**Figure 3. Soko’s Virtual Resource Planner (VRP)**

This system allowed Soko’s small-batch production model to compete with (and sometimes even outperform) traditional mass producers. Soko designed its jewelry in-house, sent these designs out via mobile app to the most suitable artisanal workshops for any given product, provided in-person training and support for artisans making new products, and finally collected all completed items at its central office in Nairobi for finishing, quality control, packaging, and distribution. Since all orders and payments were digitized, Soko was able to continually improve which artisans were selected for which jobs based on machine learning algorithms. Soko also kept up-to-date on trends of which particular skills were in rising demand based on market shifts, so the company could train artisans in new skills when necessary and thus keep all its suppliers employed for the long term.

Peinovich explained:

> We have constant data about every single artisan group that we work with, so we can actually tailor every engagement to them. We know each individual artisan’s production rate, speed of delivery, history of the product produced, and
categorization of those products. Difficulty level, motifs required, families of products—that’s all automated.

Every item of jewelry was also digitized and tracked via Soko’s custom-built platform. This allowed the company’s quality control officers to rate each item and connect product metrics back to individual artisans, who were graded according to quality, timeliness, responsiveness to communication, production capacity per time, and availability. Quality control officers rated every individual item of jewelry as AA, A, or B-grade. Since one of Soko’s quality factors was consistency, a number of individually high-quality items ended up with a B-grade if they did not have an exact resemblance to other items of the same batch. These items might include pieces of horn with a naturally different color, or jewelry featuring a hammered finish that happened to have a slightly different stipple from everything else but otherwise met all quality criteria. The high-quality, B-grade products that looked like their sales photos could be sold online; online consumers only saw one product at a time, unlike customers looking at a sales rack in a department store who might expect everything to look identical.

Soko’s wares were cost-competitive with mass-produced jewelry of comparable quality. Their professional designers generally came up with new product lines every six months or sooner, and Soko’s suppliers manufactured these designs in bulk across a distributed “virtual factory” of artisanal workshops. When dainty pendant necklaces came into fashion in mid-2017, for example, Soko’s design team in San Francisco was quick to roll out a series of fashionable pendants inspired by Maasai shapes.

Figure 4. Pendant designs from Soko, inspired by Maasai shapes

Source: ShopSoko.com, September 2018

Soko’s horn and bone artisans purchased their materials directly from local butchers, who provided them with unprocessed horns and bones as byproducts of meat processing. Before Soko contracted their services, many brass artisans had been sourcing their own materials, as they had been manufacturing jewelry for years on their own terms. Brass was a popular material around Kenya that was used for many purposes, so artisans often saved money by collecting brass scraps from the landfills of old homes.

This posed a problem when Soko’s team realized that some older types of brass contained lead. All Soko’s jewelry had to comply with the strictest global lead standards because they had little control over the final location of product sales. Soko thus had to ensure that its artisans used entirely unleaded raw material. For larger orders, Soko headquarters started sourcing its own
recycled brass, which was tested for lead, melted down, and sold to artisans in the form of bricks. This made it easy for Soko to test out lead levels before large batches of jewelry were manufactured. Thanks to careful quality assurance and frequent testing, all of Soko’s jewelry, whether produced from locally sourced brass or Soko’s bricks, was devoid of any detectable lead.

**Figure 5. The evolution of Soko’s business model**

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<td><strong>Fashion brand</strong></td>
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<td><strong>What’s next?</strong></td>
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<td>Soko hired its own jewelry designers, but had to reject 40% of items the first year because artisans couldn’t keep up with retail’s quality control standards.</td>
<td>With most of Soko’s sales in the last quarter of the year, the team expanded its value proposition into Asian markets.</td>
<td>Soko was on track to grow its revenue by 80% in 2018... but Peinovich had to strategize.</td>
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<td><strong>Etsy for Africa</strong></td>
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<td>Soko’s initial model was to sell jewelry designed by artisans—but these weren’t fashionable enough for people to buy regularly. This model barely made a profit.</td>
<td>Soko hired quality assurance officers and provided precision equipment to artisans through asset financing—bringing rejection rates down to 30% in 2013, and 10% in 2014.</td>
<td>Soko had 75 full-time employees and 2,500 artisans by mid-2017. Producing an average of 35,000 units per month, Soko grew by 70% over the year.</td>
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**Core Value Proposition**

Soko consisted of a jewelry design firm and a vertically integrated, high-tech supply chain that turned a disparate network of artisans into an ethical manufacturing company. Soko catered to two sets of stakeholders: artisanal jewelry suppliers and the fashion-conscious customers who bought its wares.

**Table 1. Soko’s two-sided market**

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<tr>
<th>Suppliers</th>
<th>Jewelry Consumers</th>
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<tr>
<td><strong>Mostly lower-income jewelry artisans</strong></td>
<td><strong>Mostly middle-income professional women</strong></td>
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<td>- Stable long-term business partnership</td>
<td>- Beautiful designs</td>
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<td>- Competitive wages</td>
<td>- High-quality artisanship</td>
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<tr>
<td>- Flexible hours and location</td>
<td>- Competitive prices (US$50–150)</td>
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<tr>
<td>- Training in new skills and quality control</td>
<td>- Trendy, fashion-conscious wares</td>
</tr>
<tr>
<td>- Asset financing for new tools</td>
<td>- Availability (online or local retailers)</td>
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<tr>
<td>- Prestige of international sales</td>
<td>- Ethical sourcing</td>
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Customers could purchase Soko jewelry indirectly through retail stores and other fashion brands, or directly through the website ShopSoko.com and from Soko’s own storefront in San Francisco, California. Peinovich and her co-founders were always set on catering to mainstream fashion consumers, although this demanded that they compete on price. About 90% of Soko’s sales were direct to businesses such as department and specialty stores, while the other 10% of sales took place through Soko’s curated channels. Only a fraction of Soko’s direct-to-business sales were marketed to customers through fair trade or ethical production messaging; Peinovich said that many of these final customers bought Soko’s jewelry “based on price and aesthetics only.” Nonetheless, Soko’s products sold best when they were tied to the Soko story of “helping artisans lift themselves out of poverty.”

Soko’s business-to-business sales also benefited from its ethical production label, especially in the wake of fashion factory disasters like the 2013 Rana Plaza collapse in Bangladesh. “Retail is really jumping at this opportunity to work with ethical fast fashion,” Peinovich said. “They see it as a great alternative. We are able to meet their style and price requirements without compromising on our values.”

For its artisanal suppliers, Soko provided relatively stable work at decent wages and helped semi-skilled artisans become highly skilled and more employable. Notably, Soko supported its artisans in growing their businesses through skills training and asset financing. Most of Soko’s suppliers tended to contract their work to multiple companies, from other informal workshops to jewelry companies to home goods manufacturers, in addition to producing their own jewelry for local markets. Soko’s internal surveys indicated that most artisans would have chosen to work for Soko full-time if there had been more work available.

One of Soko’s early suppliers was jewelry maker Veronica Rachiedo, who used to work alone out of her small bedroom in Nairobi’s slum community of Kibera.

*Figure 6. Veronica Rachiedo at work*

Source: Ella Peinovich
“Soko saved my life,” Rachiedo told Peinovich. “Before Soko, I barely had enough to eat. Now with Soko I have started my own business, even hired my first employees, and can provide for my family without fear.”12 Through Soko, Rachiedo received training and asset financing to upgrade her shop’s equipment, which in turn enabled her to increase revenue and move her family out of a corrugated shack and into a proper house. By 2017, Rachiedo was managing eight employees across two factories, and was one of the few female artisans who supervised male workers.

Even though Soko didn’t pay as well per item as some fair trade companies, they issued contracts on a much more regular basis. Peinovich described how jewelry customers tended to view costly fair trade items as “guilt-ridden purchases” to be bought on occasion, while Soko’s trendy and more affordable items always gave fashion-conscious customers a reason to shop at Soko. One fair trade company, for instance, purchased jewelry from some of the same microfactories as Soko but sold its necklaces for US$300, compared to Soko’s price of US$65 for an equivalent item. The lower price may have meant lower pay per item for artisans, but by launching a fashionable new product line every six months, Soko was also able to provide more stable employment by encouraging its loyal customers to come back every season.

As Soko scaled up, one of Peinovich’s personal goals was to bring more female artisans into her supply chain. In early 2017, Soko had launched a women’s initiative to partner with all-female artisan groups and provide additional training for women, leading to an increase in Soko’s female-led microfactories from 2% to 16% by mid-2017. Additionally, Soko’s team of full-time employees (not including contracted artisans) was 70% female, but Soko still had a long way to go before reaching gender equity among all its artisans. Brass and horn work had traditionally been a male-dominated sector in Kenya, and women made up only 26% of Soko’s active artisanal network. Peinovich and her co-founders initially tried commissioning beadwork, a more female-dominated craft, but it did not sell as well as brass and horn in today’s international jewelry market.

Informally, Peinovich identified three different types of motivations among Soko’s artisans. This distinction helped inform its decisions on which artisans to contract for what purposes:

- Enterprising: 50–70% of artisans had a long-term plan for scaling up operations and wanted to invest in better precision tools. Soko provided these artisans with new equipment through asset financing. This category had considerable “stickiness”; enterprising artisans cared about increasing their production capacity and proving themselves as trustworthy, and thus provided the best long-term return on investment for Soko.

- Artistic: about 20% of artisans had very high quality standards and were proud to sell their work, but they were not usually as timely.

- Money-driven: 10–30% of artisans worked primarily for immediate profit. Soko hired them when the company needed to ramp up production, but this group could not be relied on for attention to detail or long-term workshop growth.

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12 Ella Peinovich, “Building the Next Generation Supply Chain” presentation given to the MIT Legatum Center, October 20, 2017.
Staying Competitive in a Crowded Market Segment

In 2017, retail was a highly competitive sector where fashion brands competed on price, quality, and overall design. Over the previous decade, many fashion companies had shifted toward a strategy of limited small-batch production runs in an attempt to be faster in rolling out new trends and encouraging consumers to change their wardrobes as quickly as possible. This strategy became known as “fast fashion,” and was typified by retail brands such as Zara and H&M that introduced new apparel and accessories on the order of weeks rather than months. “Global consumers are addicted to this thing that we call fast fashion,” Peinovich said. “The pace from design creation to having products on the shelf is shortened to a matter of weeks.”

As fashion became faster, many major retailers shifted to buying small batches of items at a time, so they were more likely to sell out and therefore capture the full market value of their line. By 2017, batch size had been shrinking for several years, such that a smaller company like Soko was now better able to compete with jewelry brands that owned mega-factories, as both brands were likely to sell small batches of particular products to retail outlets.13 “We’re providing quality, pricing, and volumes,” Peinovich explained.

The flexibility of online platforms and the ease of virtual shopping helped drive this trend, particularly among millennials. In the United Kingdom, fast fashion accounted for 25% of apparel sales in 2014, and the number of Zara stores in China grew 60% annually between 2007 and 2012.14 (For more information about Zara, see the appendix.) By 2014, some fast fashion companies had created up to 52 “micro-seasons” every year through weekly shipments of new trends.15 These companies encouraged consumers to purchase new clothes as soon as styles fell out of fashion, and pressured suppliers to provide an ever-changing diversity of goods at very low prices, often leading to stressful labor conditions and low wages for workers. Due to these small profit margins, there was considerable churn throughout the sector; suppliers and fashion brands were quickly forced out of the market when they failed to compete.16

Both Zara and Soko distinguished themselves through contemporary fashion design and trustworthy brand names rather than extensive marketing budgets. Yet, Soko’s co-founders wanted to take advantage of the trendiness (and small sales volume) of fast fashion without sacrificing their sustainability standards. In an interview with ReWork, Soko co-founder Floyd described Soko’s fashion model as both “fast and ethical”:

Through our innovative business model, we are redirecting existing consumer dynamics toward products which are less costly on human lives and the environment without sacrificing style and affordability. Ethical Fast Fashion is our way of producing stylish, affordable, and ethical goods with the fastest speed

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14 Ibid.
to market. In this model, consumers can shop consciously by default, never having to make sacrifices in style and affordability.\textsuperscript{17}

With 2,700 different artisans to coordinate, how did Soko manage to thrive in the fast fashion retail market? The combination of increased logistics costs and higher-paid workers made Soko’s jewelry up to 50% more expensive to manufacture, and yet the retail price of Soko’s jewelry was cost-competitive with mid-tier market prices (US$50–150), and even cheaper than many top-tier jewelry brands of similar quality (US$200–500) (see Table 2, p. 17). Despite the complex logistics required for distributed quality control, Soko’s overall production agility provided the company with an advantage over other manufacturers. “We’re effectively crowdsourcing this marginalized artisan talent,” said Peinovich, “and we are now bringing that into a more effective and productive supply chain.”

Since large amounts of inventory were a liability in a fast-changing market, Soko’s “demand-responsive” production model and flexible production volumes helped it to stay competitive. Indeed, most of Soko’s artisans checked their mobile apps every day to receive instructions for that day’s jewelry production. This was more similar to Zara’s fast fashion model than that of a traditional manufacturer, where tasks tended to be fixed weeks or months in advance rather than introduced daily.

\textit{Figure 7. Soko’s mobile app}

Source: Ella Peinovich

Table 2: Estimated cost buckets for making a single pendant necklace that might sell at Nordstrom for US$90–100 (percentage of sale price)

<table>
<thead>
<tr>
<th>Staff</th>
<th>Au Enterprises (on-demand, 3D-printed production)</th>
<th>Soko Inc.</th>
<th>Fossil and outsourced Chinese factories</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15 skilled and semi-skilled full-time staff; many 3D printers</td>
<td>60 full-time staff; outsourced microfactories with thousands of skilled and semi-skilled artisans</td>
<td>10,000+ full-time staff; outsourced factories with thousands of semi-skilled and unskilled staff</td>
</tr>
</tbody>
</table>

| Number of factories | 1 | 1,500 active per season; 2,300 total microfactories | 1–4 outsourced factories |

| Average batch size | Tens to thousands | Hundreds to thousands | Thousands to tens of thousands |

| Overall margin captured by manufacturer | 20% (manufacturing only) | Above 30% (vertically integrated) | 20% (manufacturing only) |

| Worker margin | 30–40% of Au’s margin: US$8 (full-time staff paid US$25–35/hour) | 20% of Soko’s margin: US$7.70 overall revenue; US$3.85 as profit | ~5% of Fossil’s margin: ~US$0.60 (plus food/lodging) |

| Material and equipment costs | 4% (paid by Au) | 4% (paid by artisans) | 5% (paid by factory) |

| Shipping costs | Negligible | Above 5% | ~0.1% |

| Overhead cost of sales and labor | 4% | Above 10% | 4% |

| How long does a piece sit in inventory? | Hours to days | Days | Weeks |

| Time to roll out entirely new pendant and chain product | 5 days | ~4 weeks | 2–3 months; or up to 6 months for major retooling |

| Internal cost of rolling out new product line | US$70–140 (CAD designers already hired full-time) | Above US$200 | US$1,000–2,000 overall; US$100–500 cost to Fossil as vendors eat cost |

| Overall revenue | US$ millions | US$ millions | US$2.8 billion |

| Profit margin in 2017 compared to industry average | Medium | High | High |

| Minimum batch size for profitability | 1–2 units | 30 units | Thousands of units |

| Age of company | 31 years | 5 years | 33 years |

| Compound annual growth rate 2015–2017 | 20% | 58% | 12% |
Quality Control

Prior to Soko, most Kenyan jewelry artisans had used poor-quality drill bits and lacked the skills and tools for precision craftsmanship. Soko had been their first contractor to demand consistent quality. In early production runs, Soko had to reject almost half of its suppliers’ jewelry, angering artisans by demanding that they refurbish completed wares. Soko’s team quickly realized that if they wanted to become a globally respected jewelry company, they would have to both upgrade their suppliers’ equipment and invent a robust method for distributed quality control across hundreds of microfactories.

Soko’s dedicated efforts brought its rejection rate for sub-par products down from 40% in its first year to 30% in its second year, and 13% in its third year. Initially, only a select few of Soko’s workshops (compared to more than a dozen today) knew how to solder, and all of them used large and imprecise soldering torches. Most of Soko’s artisans had originally learned brass-work through apprenticeships to master craftsmen, and thus they’d used decades-old tools and methods. Soko started offering asset financing for precision tools to increase product quality, including small soldering torches and electric drills and bits. Artisans had been accustomed to using old rulers with faded markings, so Soko also had to provide better measuring equipment, such as new rulers and calipers, before the company could fairly demand higher quality. In addition to providing new tools, Soko needed to individually train all its primary artisans on how to use them. In workshops staffed by more than one artisan, primary artisans trained their own subordinates.

At first, Soko’s artisans were annoyed by such strict standards. They were used to fair trade companies that charitably preferred to employ more artisans rather than ensure high-quality wares, so they were surprised when Soko rejected their jewelry. As Soko prioritized long-term growth, the company eventually convinced almost all its suppliers to adapt to its high standards. Initially, some artisans had to self-select types of jewelry that they could complete to specification, while a few artisans gave up and dropped out of the Soko network. Today, Soko’s artisans can reach a millimeter-level of precision that Peinovich says is “unprecedented” for the informal craft sector.

Once Soko’s artisans figured out how to manage quality control, they started to complain about Soko’s short time frames for delivery, but Peinovich felt confident these complainers would adjust and grow capacity to meet the new challenge, just as they had adjusted to Soko’s initial quality requirements.

Soko hired fieldworkers to teach its artisans additional skills, including how to improve metalworking techniques and how to work with horn and bone to expand their repertoire. By 2017, the company had nine full-time staff members who visited Soko’s suppliers on a regional basis to perform routine quality control checks and train artisans. Building upon the success of these regional staff members, Soko started training some artisans to become full-time quality assurance officers to help onboard and train new artisans.

The costs of training, distributed quality control, and asset financing were all built into Soko’s financial model, and the company’s agile production methods made up for the added cost burden. Nonetheless, since all new artisans had to be trained personally by Soko staff, the quality standards required to compete with international jewelry manufacturers were a significant impediment to
introducing new artisans into Soko’s supply chain. “Onboarding artisans is frankly our biggest bottleneck,” Peinovich said.

Agility and Flexibility

In 2017, Soko could turn a jewelry design on paper into an item for sale at Nordstrom within 6–8 weeks, while a more traditional jewelry brand like Fossil generally required 2–3 months to introduce a new product (see Figure 4). To fulfill a new product offering, Soko first built up infrastructure and trained all of its artisans for production, and then the company validated product demand for its wares internationally. As befitted a modern production facility, Soko’s success and agility relied upon its comprehensive feedback mechanisms and continuous communication with artisans.

Distributed cottage industries were far more flexible in scaling production up or down than workers in a large factory setting, as there were low daily operating costs associated with production. Since artisans were paid by the piece, all workers were free to set their own working hours. For firms in the fashion industry where product lines shifted every season, greater product differentiation and demand volatility led economies of timing to take precedence over economies of scale.18 If a certain product line was selling well, Soko could reach out to hundreds of artisans instantly through its mobile platform, and tell them all to scale up production. Soko could also notify these artisans directly about minor improvements to designs or production methods. Depending on the cost of labor and resources, Soko occasionally needed to renegotiate prices with artisans after its initial order, which could be facilitated through constant virtual communication with suppliers.

Soko once rented out a factory as a pilot project to experiment with centralized production. This led Peinovich to observe that Soko’s artisans paradoxically demonstrated “reverse economies of scale.” Cottage industries and end-to-end production allowed artisans to see and fully appreciate the value of their individual work, so these skilled artisans found Soko’s attempt at a factory assembly line to be personally devaluing. They declined in productivity, abused equipment that did not belong to them, and failed to pay close attention to quality since they were only responsible for a single step of the finished product. Most of these artisans chose to go back to their own cottage workshops when given the choice, and Soko later shut down the pilot factory.

Soko’s virtual factory model involved rapid turnaround with minimal inventory costs. Typically, the company’s artisanal microfactories took two weeks to produce a batch of dozens to several hundred items of jewelry. Most artisans employed a staff of 3–5 people, with larger microfactories employing up to 10 full-time and/or part-time workers. By 2017, Soko’s variable demand had forced its more regular artisans to train new casual workers and prioritize timely production. Artisans stocked completed jewelry in their own workshops until they were ready to deliver an order in bulk to Soko headquarters in Nairobi. Deliveries were due two to three weeks before shipment abroad. Since most suppliers were based in or around Nairobi, transportation had not been an issue, and some artisans even carried their wares to Soko headquarters in person. In contrast, traditional mass-manufacturers tended to keep significant inventory, and were thus more

concerned about selling off their current wares (before they became obsolete) than designing and setting new fashion trends.

**Figure 8. Soko’s supply chain and timeline**

Source: Gilbert Kimutai, Head of Technology, Soko

**Figure 9: Soko’s payments to artisans per quarter (company data)**

Source: Case writers
Because large factories employing full-time staff are costly to maintain and shut down, mass-manufacturers typically keep their factories operating at high capacity throughout the year. In contrast, Soko’s virtual factory could increase its production capacity by an order of magnitude over one season at no additional cost, allowing the company to respond even more flexibly to consumer trends as demonstrated by the chart of Soko’s payments to artisans (see Figure 8 above). Although Soko’s suppliers were rarely pleased about tripling their maximum production capacity overnight, most were able to bring in casual, unskilled labor from trusted friends or relatives for simpler tasks such as polishing. Soko could also warn its suppliers in advance about periods of low demand, allowing artisans to work on their own goods or pursue other business opportunities.

Soko’s VRP system and wealth of data helped it to keep track of the maximum production capacity of each microfactory. Soko’s team knew exactly when and where extra skills and capacity would be available, allowing the company to distribute production accordingly. In 2016, Soko only required 10–30% of its suppliers’ production capacity during periods of low demand. Over the spring, Soko’s suppliers doubled their Soko production for 2–3 months, then kept up a constant rate during the summer. In 2016, Soko sold 60% of its entire annual stock during the last quarter of the year for the holidays, during which time it increased production by pre-producing some products, extending timelines, and encouraging some suppliers to invest in additional equipment and bring in casual labor for low-skilled tasks. Peinovich wanted to smooth out production levels among their suppliers to a more consistent 50% of Soko’s capacity year-round, which would be a welcome opportunity for stable work for many of Soko’s artisans. Those artisans who preferred to take jobs with other contractors could adjust their rates and availability through Soko’s app.

Handicraft as a Design Choice

The legal definition of “handmade” or “handcrafted” products was vague enough to allow many types of jewelry that are made with 3D printing or other digital fabrication techniques to still qualify as “handmade.” Yet, a decent segment of jewelry customers placed additional value on items that were legitimately made by hand. Fuchs et al. (2015) found a statistically significant preference toward purchasing handmade objects as gifts in their survey of Austrian consumers, and noted that US consumers purchasing soap as a Mother’s Day present were willing to pay US$6.56 for handmade soaps versus US$5.63 for machine-made products. Fuchs et al. found the handmade effect to be particularly strong when people were buying gifts for their loved ones; judging by Soko’s dramatic increase in sales around the holidays, many of Soko’s customers were indeed purchasing their wares as gifts for others.

Peinovich knew that a combination of 3D printing and handicraft would be more cost-effective than Soko’s purely handcrafted production process for high volumes of wares. For very high volumes, mass-production using dies would outcompete hybrid 3D printing of metal jewelry.

Thus, the market niche for Soko’s handcrafted jewelry relied upon marketing the *handmade* quality. The amount of manual labor required for an individual item of jewelry might be obvious to a layperson due to irregularities or other unique, individual qualities. Or, its “handmade”

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qualities might be stated explicitly in information presented about the product. As Peinovich said, “We at Soko believe that humans are our best asset!”

The label on all Soko-branded products used the term “handmade”; this was also common among other fair trade jewelry products. Soko’s in-house designers strategically developed designs that were difficult to produce through 3D printing. This led to what Peinovich describes as a “chunky, bold aesthetic,” such as this Double Dash Choker Necklace (Figure 10) which was a perennial Soko bestseller:

Figure 10: Soko’s Double Dash Choker Necklace and Daya Statement Drop Earrings

The lack of fine detail on this choker and the sheer volume of brass required made it particularly difficult to 3D print out of brass, and it would also be time-consuming to 3D print hundreds of these as wax molds for hand-casting. Instead, it was easier and cheaper for skilled Soko artisans to hand-carve several wax positives out of wax, and then pour molten brass into the molds. Artisans also did some sanding and polishing, but most of the finishing touches like electroplating and final polishing were performed at Soko headquarters in downtown Nairobi. Soko’s designers also strove to highlight the uniqueness of artisanal handiwork, as opposed to the sameness of machine-produced items. Peinovich said that a “certain level of irregularity is welcomed.” For example, the description of Soko’s Daya Statement Drop Earrings on ShopSoko.com advertised the item’s “distinctive hand-cast statement silhouette” (see Figure 10). The fact that every earring looked slightly different was thus highlighted as a feature, and became part of Soko’s “hand-cast” charm.

Soko V3: What’s next?

As Peinovich crunched guava seeds, she reflected on Soko’s progress up till then. Its co-founders had developed a profitable business model and reached a stage of consistent growth: The company’s revenue doubled from 2014 to 2015, and doubled again in 2016. Halfway through 2017, Soko had already sold more jewelry than it sold throughout all of 2016. Soko’s customers included tens of thousands of ethical, fashion-conscious consumers across 40 countries, as well as major fashion retailers such as Nordstrom, Anthropologie, QVC, and others. Moreover, Peinovich had recently hired a full-time VP of sales clients to coordinate with these brands.
Scaling up from this point, however, would still be challenging. Peinovich realized that Soko’s greatest obstacle to scaling up was identifying the right business plan. There were only so many skilled artisans working with brass, bone, and horn across Kenya, and Peinovich had grand plans for transforming large swathes of the retail sector and fashion industry through her virtual factory. Given the rising demand for Soko’s wares among fashion retailers, Peinovich was wondering whether 2018 might be the year for Soko to scale into new value propositions and realize the full potential of its manufacturing platform. Should Soko expand into new jewelry markets, or diversify into other types of artisanal wares?

On the other hand, Soko’s current suppliers were sorely underutilized; they only manufactured at (and above) capacity during the last three months of the year to satisfy holiday shoppers. Peinovich wanted to consistently employ her suppliers at around half of their overall capacity, yet Soko only averaged 20–40% of supplier capacity from January through September 2016. Were there strategies that Soko could apply to better utilize its existing capacity?

Peinovich had found it difficult to gain access to capital due to Soko’s non-traditional business model. On the one hand, banking facilities and traditional investors did not fully understand the concept of Soko’s manufacturing platform and virtual factory; on the other hand, Soko was already generating too much revenue for traditional grant agencies to take an interest. Since Peinovich was not sure whether she could secure significant outside funds, any strategy for scaling up had to be either self-sustaining or able to quickly turn a profit—and Soko was not yet profitable due to high marketing expenses and fixed capital expenses in 2017.

Peinovich was certain that Soko’s jewelry business would become profitable so long as it stayed competitive with mass-manufacturers on price, quality, and design. The question then was: In which areas should Soko consider expanding? Any decision that Peinovich made had to satisfy her team’s high standards for ethics, quality, uniqueness, and overall disruptive global impact. In order to increase impact, Peinovich had to increase her quantity of sales—but could this be done without sacrificing quality? When Peinovich needed to onboard new suppliers, could she find enough semi-skilled artisans to train to meet her standards, or would she have to train new suppliers from scratch?

Peinovich ruminated over these questions as she picked another guava from the tree. To cater to all her stakeholders, Peinovich needed her current customers to keep believing in the Soko brand, yet she also needed to provide new economic opportunities for Soko’s current and future artisans. Peinovich was certain of one thing: Between Soko’s robust technical platform, its capable team, and its network of enthusiastic suppliers, her company was well positioned to disrupt traditional manufacturing systems worldwide.
Acknowledgments

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Teachers, We Want to Hear from You

Have you taught this case? Are you considering doing so? We’d love your feedback! We may write case updates in the future and appreciate fellow teachers’ input. Please contact us at legatum@mit.edu, and put “case study” in the subject line.
Appendix: Example of a Fast Fashion Giant

Zara was a pioneer in the fast fashion industry and among the world’s most valuable brands. While most brands bet on yearly fashion trends and manufactured 80–90% of their products in advance, Zara only manufactured 50–60% in advance in 2016. To facilitate its rapid on-demand production model, Zara voluntarily kept up to 85% of its factories idle at any given time so it could quickly scale up manufacturing as needed. It manufactured 50% of all items in Spain within 11 factories, all within a 16 km radius of its headquarters. The company even owned 200 km of private, high-speed monorails to quickly transport cut fabric to factories for dyeing and sewing.20

Similar to Soko, Zara elected to pay higher labor costs in order to keep its factories more responsive. While Soko’s higher costs were mostly on the quality control side, Zara paid higher than global market rates for labor in order to run half of its factories in Spain. In 2016, Zara paid an average of US$9.60 per hour to its Spanish workers, as compared to the industry average of US$0.50 per hour for Asian workers. Roughly a quarter of Zara’s products were manufactured by outsourced factories with cheaper labor in Asia, Africa, and Latin America (where one of Zara’s outsourced plants in Brazil was accused of “slave-like” conditions by a Forbes journalist)21. The last quarter of Zara’s goods were manufactured in Europe. Zara made up for its increased production costs by selling most of its wares at the highest possible price point; while the clothing industry sold an average of only 60% of its wares at full price, Zara sold a record 85% in 2016. Zara was criticized for stealing ideas from high-fashion designers directly off the runway, before any other fashion brands were even aware of burgeoning trends.22

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22 “Zara Clothing Company Supply Chain,” op. cit.