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# # Who Made My Cotton

#2

Conducting an investigation within the denim industry to identify the roadblocks toward radical transparency on cotton's origins

step 2

denim mills,  
spinners &  
weavers

*Cotton  
Diaries*



step 1 |  
brands & retailer

step 2 | mills,  
spinners, weavers



steps in purchasing

where traceability  
gets tricky

roadblocks

why traceability  
matters

solutions

THE  
NEXT  
STEP?

We are on a quest to uncover the roadblocks and solutions in the denim industry for full cotton traceability. Working our way down the supply chain, we started by interviewing denim professionals in the business of buying fabric, and in part two of this qualitative research study, we are following up with those in the business of making denim fabric. We interviewed ten denim mills from varying countries in which 9 of them are spinning their own cotton. Combining spinners and weavers in this report, we dive deep into the roadblocks mills have in gaining full traceability from farm to fabric and the many solutions these suppliers are currently working on.



This study is not meant to name and shame, but to understand the reasons preventing the denim industry from seeing clear through its supply chain.

Mills are responsible for supplying the globe with denim fabric, and in doing so, they need to obtain the raw materials to weave the many different fabrics brands make their jeans from. For the most part, denim is made of cotton, which means mills that spin their own yarns for weaving are directly involved in purchasing cotton.

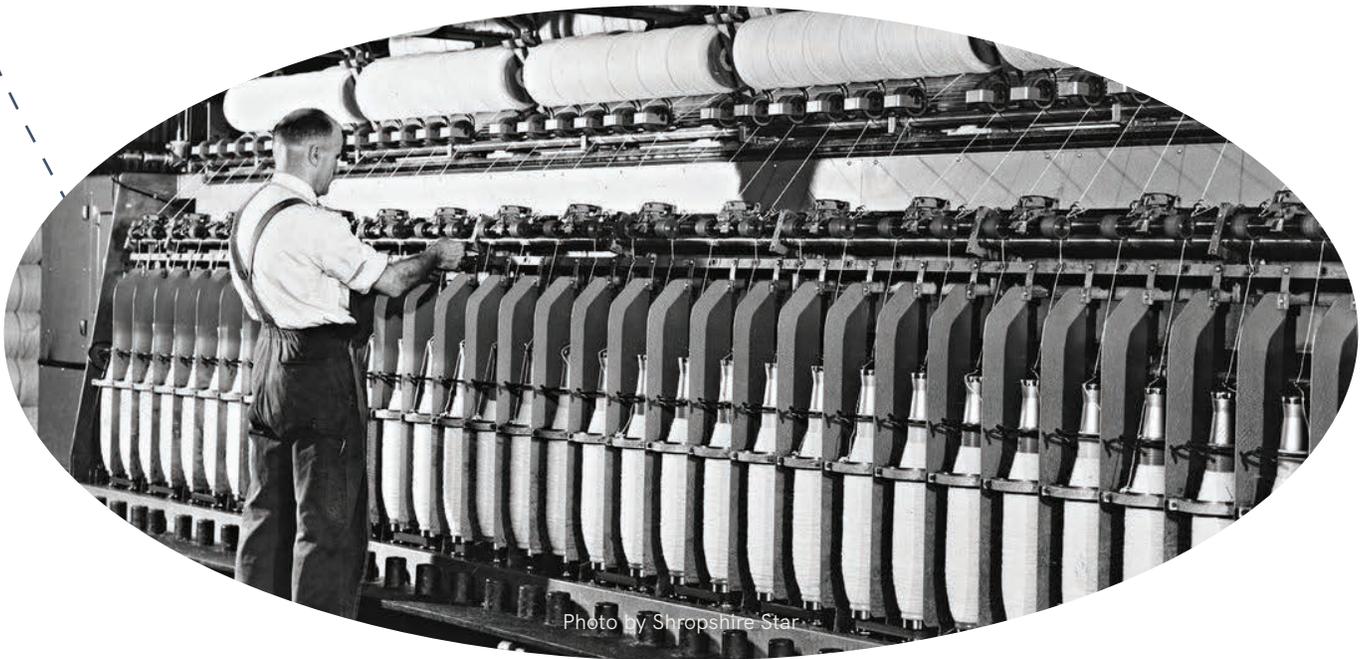


Photo by Shropshire Star

# step 2 denim mills, spinners & weavers



## Steps in Purchasing

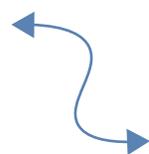
Every mill has a buying team that determines the quantities of cotton that need to be purchased each year based on the orders they have received from brands and usually relies on traders, merchants, agents and brokers to buy their cotton.

The mills have built long-lasting trustful relationships with a handful of merchants who will find the best cotton quality and prices that will suit their needs, working with different merchants for each specific part of the world from where they buy their cotton.

When buying locally (meaning in their own country or regions), mills sometimes deal directly with ginners or farmers. While this remains a small portion of mills buying cotton, this practice is gaining popularity as it allows better traceability in the cotton provenance.



mills



middlemen



farmers

## → Qualities:

Mills have specific requirements for spinning their yarns regarding the quality of cotton fibres. And with differing cotton characteristics from every region, mills specify what regions they want to source from or which regions they want to avoid. These specificities are communicated to the merchants in charge of finding the cotton bales that match the description and price target.

Things to look out for in cotton quality: staple length, length uniformity, strength, micronaire (measurement of fibre fineness and maturity), colour and HVI\* trash (or contamination).

Staple length is one of the most crucial aspects when sourcing cotton. Regular denim can allow for pretty short staples, while a thinner hyper stretch requires longer yarn. Spinning machines are calibrated for a range of staple lengths, and mills will blend different cotton qualities to reach the right average fibre length and maintain consistent quality. However, this blending stage is where traceability gets tricky, which we will dive into in the following section..



### According to Cotton Works:

HVI is a testing machine capable of measuring many cotton fiber properties including length, uniformity, micronaire/fineness, strength, color, etc.

When cotton fiber is tested using HVI instruments, the surface of the sample is scanned by a video camera. The percentage of the surface area occupied by trash particles is then determined by image processing software.

## → Risks (investment and price fluctuations)

Cotton is the mills' primary source of raw material and expense. The cotton consumption of the mills we spoke to ranges between 10,000 to 60,000 tons of cotton each year. But, ensuring enough cotton for mills' yearly requirement means mills need to maintain at least 2 to 6 months of cotton supply. While cotton has one yearly harvest, it is bought consistently throughout the year.

Cotton buying can represent 55% to 60% of the total expenses of a mill and is such a crucial investment that in some companies, this responsibility generally remains in the president's hands.



As we have seen recently, cotton prices fluctuate. And just this year, the price of cotton as of April 13, 2022 reached \$1.4277 per pound, the highest we have seen since June of 2011. So, to sell denim fabrics at a fixed price every season, mills rely on their brokers to provide them with stable cotton prices in the longer term (6 to 8 months).

While buying futures guarantees a pre-negotiated price to the mill, it also guarantees cotton specifications, however, exact quality can vary. Some mills prefer buying existing stocks that they can inspect beforehand, either themselves if it is located nearby or via a staff member or an agent on the ground. This is called "buying on spot."

Delivery time and payment terms are also negotiated between buyers and traders to ensure a steady supply and the solid cash flow management that every healthy business requires.

\*We will get more into the details of cotton merchants and brokers in the next steps of our research.



# Where Traceability Gets Tricky

## → Importing

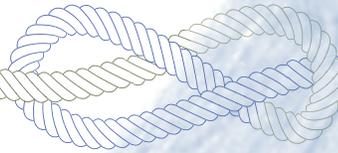


When importing cotton from different regions, there are different levels of traceability. Most mills prefer to buy cotton from Brazil and the USA due to their rigorous traceability efforts to identify farm-specific provenance through their Bale ID numbers. More specifically, Brazilian BCI cotton and cotton from the US Trust Cotton Protocol. On the other hand, our interviewees experienced little to no traceability from countries such as West Africa and Tanzania.

As Cone Denim explained to us, the PBI (Permanent Bale Identification) number for most growths will take you to the gin and, in some cases, the farm. This PBI number will include the gin code and gin bale numbers as a single, 12-digit number displayed in both a barcode and an eye-readable format on the bale tag. USDA Agricultural Marketing Service will assign the 5-digit gin code component of the PBI number, and the individual gins or warehouses will determine the 7-digit gin bale component of the PBI number.

When sourcing from regions with thousands of smallholder farms, we are often stopped at the ginner. However, with the right questions and resources, some mills feel confident they can work to find further information from their ginner's suppliers.

## → Blending



As we learned above, blending ensures that the cotton quality needed for spinning yarns is met. The more blending that occurs, the more uniform the yarn becomes. But, as you can imagine, by blending different bales of cotton, the more challenging traceability in a denim fabric becomes.

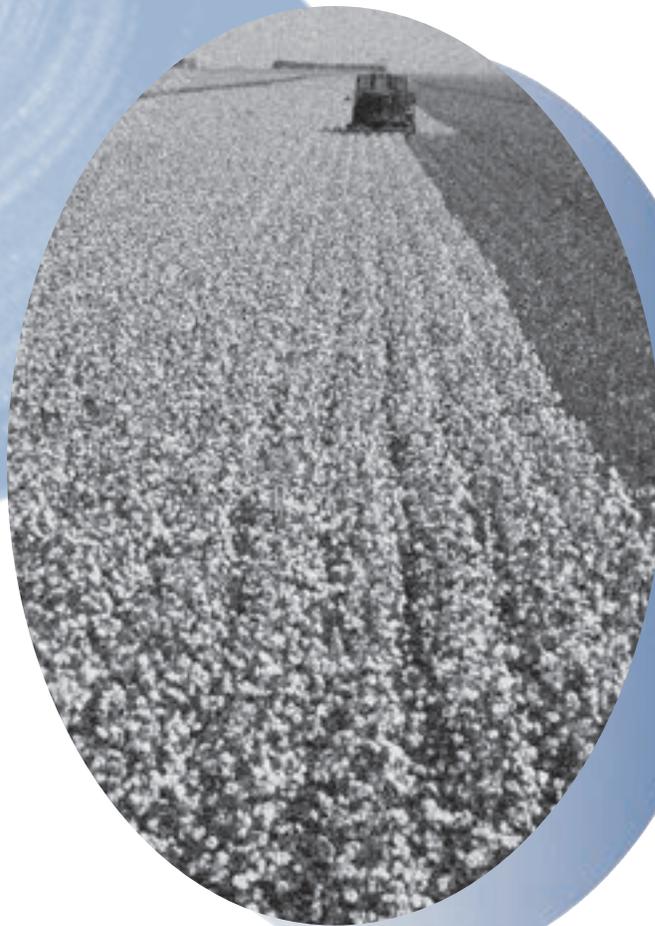
Once the cotton is bought, it goes through an opening, cleaning, and, yes, blending process to get ready to be spun into yarns. In this case, let's take 100% cotton yarn as our example.

First, the cotton is "laid down" to select the appropriate bales for the yarn quality you are trying to achieve. The number of bales is not as crucial to mills as the fibre properties of all the bales in one laydown. As you can see, this is when it starts making cotton traceability a challenge.

Next, we go through an "opening" process to prepare the cotton for cleaning and blending down the road. The cotton goes through a series of cleaning machines that remove all the impurities that were not removed during the original ginning process. The goal is to clean and blend the cotton into a very uniform mix before the next step of spinning yarn.

When making denim, it is important that mills are not buying cotton of a higher quality than needed, that would involve over-spending. Blending is also a way to control the yarn price and, therefore, denim. Expensive high-quality cotton will bring strength to the yarn, while cheaper short staples will help balance out the final price.

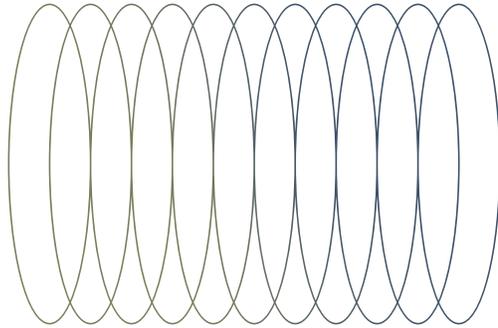
Many denim brands carry over their bestselling jeans season after season, and they repeat their specific denim orders accordingly. They also expect denim mills to provide them with consistent quality. While cotton quality might vary from one harvest to the next and its price fluctuates, mills will adapt the blending to maintain quality.



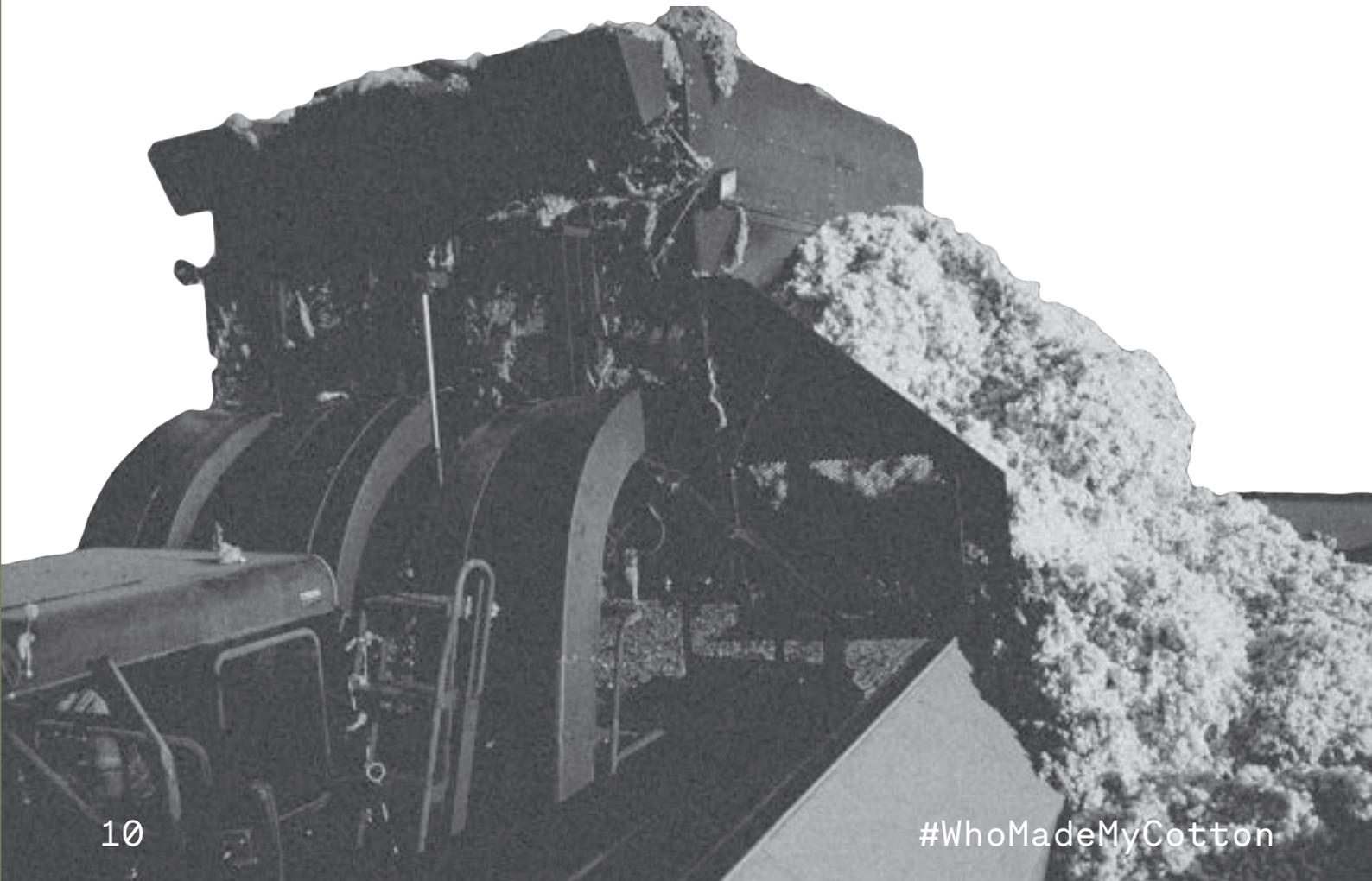
If mills were to reveal a different cotton origin every season for one same denim reference, there is a strong concern that brands would worry about its quality. In turn, this might be why some mills would rather keep this information confidential.

## → Middlemen

Going through the cotton purchasing process, many different middlemen assist in the buying process. There are cotton merchants, brokers, and ginners involved in selling mills cotton who source the raw materials from different farms. Not to mention importers that source cotton globally depending on quality needs. The more cooks in the kitchen, the more difficult it gets to find the original source.



Things get even more complex at the gin as one ginner can gather cotton from hundreds of small cotton farms. One cotton bale can contain cotton from 300 to 500 different farmers!





## Why Traceability Matters

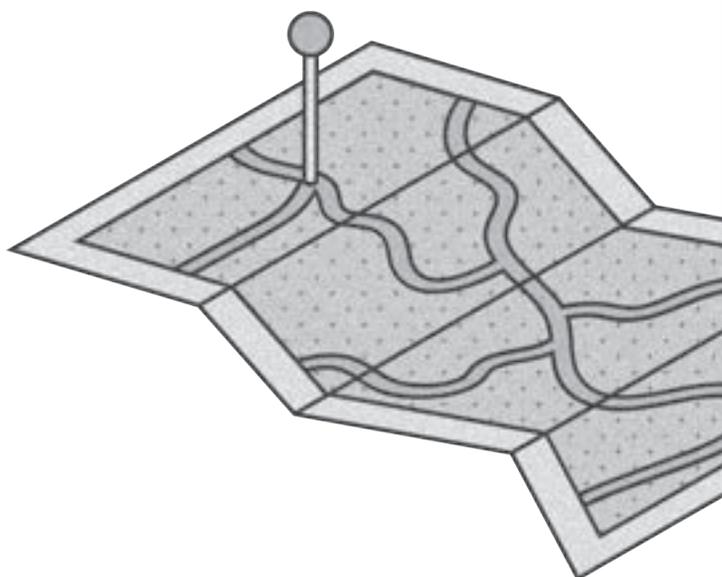
### → Ensuring social impacts are positive

Traceability is key to our sustainable denim future. With the many social implications of growing cotton, denim has a huge responsibility to do their due diligence within their supply chain. A major part of that supply chain is the cotton supply chain.



### → Gathering impact data

While tracing our supply chains has become a signatory of good business, the supply chain tracks and traces to identify areas of concern so improvements can be made. With cotton traceability, the goal is to not only ensure the livelihoods of farmers, but also want to be better stewards of our land.





# Roadblocks

## → If No One Asks, Why Bother

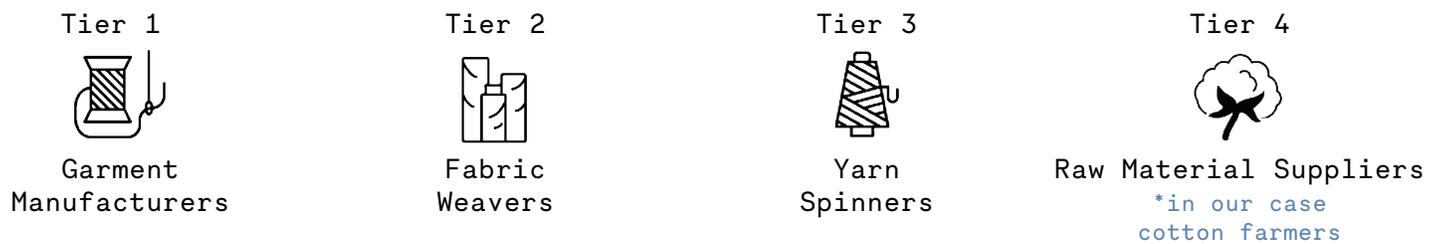
Even though it may seem like transparency is becoming the norm in brands' sustainability endeavours, we are still far from full supply chain traceability. We often see disclosure of Tiers 1, 2 and 3 impacts and locations, but Tier 4 data is hard to come by. As we spoke to different mills across the globe, we found that most brands are simply not asking their suppliers for farm-level data or provenance. Only 1 out of the ten mills interviewed reported that most of the brands they supply are asking for farm-to-shelf traceability. And because of the vast amount of resources it takes to reach full cotton traceability, if no one asks for it, mills are not prioritizing it.

There is a large discrepancy, but we see a huge difference in brand behaviours depending on a mill's market positioning. However, there are diamonds in the rough who ask their suppliers for further information, and this is often where pilot projects are born.

In step 1 of our research study, we mentioned the "limits of certifications" and how relying only on these could be a way for brands to avoid taking their responsibilities and doing their due diligence. On the mill's side, fraudulent certifications have pushed many of them to develop their own programs.

 Side Note: From our understanding, all mills can easily trace back up to the ginner. If it is "general cotton" (as opposed to certified), mills might not want to disclose the names of the traders and ginners, although they have the information... because this would require extra work that they are not compelled to do or compensated for.

### \* SUPPLY CHAIN TIERS \*



## → Partnering With Farmers

8 out of the ten mills we have spoken to have either set up direct-to-farm programs in their own countries or invested in traceable cotton technologies allowing them to reconnect with farmers.



In many cases, direct-to-farm programs go hand in hand with setting up organic practices.

As the demand for organic cotton increases and supply cannot keep up with demand, mills are working on their own farmer programs, helping them switch from conventional to organic while ensuring traceability. However, from a mill perspective, convincing farmers to transition to organic is often highly challenging for them.

From our interviews with mills that are developing their own programs, we learned that the most common way mills have found to convince farmers to transition to organic is to incentivize them with money. And because farmers are already profiting from their conventional ways, it is hard to motivate them to take the risk of change, especially with a three-year transition period. During this period, farmers usually invest a significant amount of money while not being able to receive the so-called “organic premium” yet. They are also worried about going through a loss in the yield of their crops.

Communication with farmers also seems to be a significant inhibitor to gathering impact data. Many of the methods we have seen require tech-savvy farmers who need extensive training on inputting data. Other methods just aren't made for a multitude of smallholder farmers, but are intended for industrial-scale farms.

There's a large variety of cotton farmers around the globe whose challenges, practices, equipment and business sizes vary greatly from one country or region to the other.

For example, in India, Pakistan or in some regions of Turkey, farmers aren't large farming companies like in Brazil or the US, they are often small family "businesses".

A couple of mills in Turkey explained that if they wanted to publicly reveal the names of the farmers they would first have to ask each one of them for their consent, because of the data protection laws in place in their country.

Another mill in Pakistan raised concerns about cotton farmers switching to sugar cane, as the climate conditions in their region had made cotton growing very difficult. Climate change represents a huge threat for cotton, and farmers will need support to find and implement new practices to adapt.



## → Scaling Pilot Programs

A common roadblock to achieving full cotton traceability for all mills' cotton supply is scaling pilot programs into global solutions. For the 8 out of 10 mills that have set up their own programs, the supply chains they are working with are considerably shorter for the specific farms included in these programs. The Pakistani mill Interloop explained that initial pilot programs could be scaled throughout their local network of farmers, but going beyond that would take an enormous amount of resources, such as labour to train and visit farmers and finances to support farmers wellbeing.

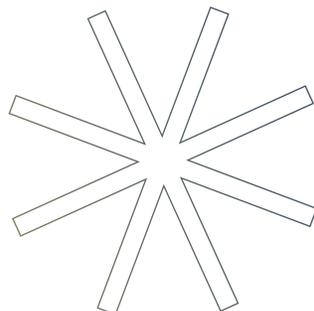
Methods are more scalable in some countries than others and create more inequalities between farmers.



Setting up cotton tracing technologies on one large farm in the US, Brazil or Australia seems like a lot less work than implementing it on thousands of family-owned farms in other parts of the world. The unequal access to resources and technologies and the wide spectrum of business sizes might favour the already advanced ones instead of enabling smaller farmers to be more resilient.

## → Financial Investment

“The cost is, so far, our biggest challenge. (Brands) are interested, they want to (trace their cotton) but the contribution is not there”. - Anonymous



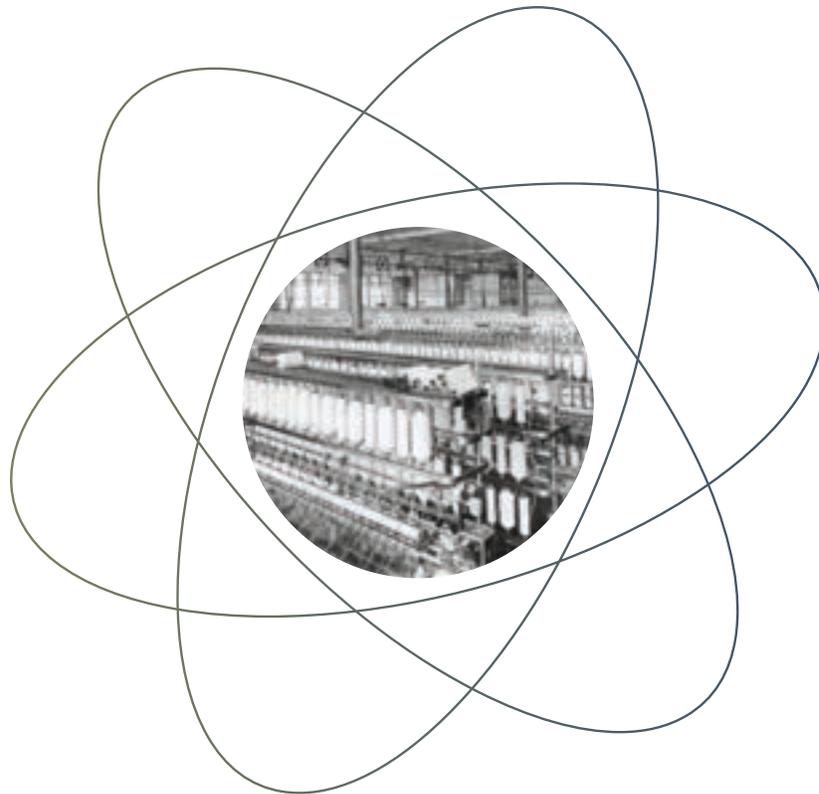
The implementation of traceable cotton programs requires important investments in the workforce and equipment. As we talked to mills, we realized that they had to bear most of these costs, drawing them from their CSR and operational budgets.

Passing on these costs to the fabric price makes it harder for them to stay competitive, and they find it hard to make brands understand an up-charge of \$0,5 per meter just to know where the cotton is coming from. The market is extremely sensitive to the cost of final fabric!

Some mills have found co-investments via brand partners. As we uncovered in Step 1 of our research, the brands that invest the most into sustainable programs, such as traceable cotton, are not the biggest ones. Their cotton consumption limits their investment and can only allow them to set up pilot programs. A mill cotton buyer we spoke to called these brand's projects "romantic." While setting up game-changing methods, pilot programs in partnership with small to medium brands can only do so much. When we asked, "What if a billion-dollar fashion brand would finance these programs?" Many mills seemed confident that it would enable them to staff up and extend these practices to their whole cotton sourcing.

A mill we interviewed had decided on its own initiative to develop its own pilot programs. Unfortunately, after pitching it to their clients, they couldn't find the right brand partner to kick start it.

Another one expressed reservations regarding brand partnerships. They feared becoming beholden to a brand that could, for example, dictate the price of their fabric. Instead, they prefer to self-invest and keep their independence. They would rather receive guaranteed orders from their customers to keep jobs for their workers. Another way they found to finance innovation is to negotiate exclusivity with brands for a certain amount of time, ensuring their R&D cost is partially covered.



**Side Note:**

Maintaining control is a concern when brands have significant involvement in decision-making. A mill owner expressed his worries about brands dictating how denim should be done without understanding the actual environmental impact of each and every step of making it. What brands find easier to communicate about might not be the most impactful technologies, and the requests they have might not be the most efficient ones to reduce the denim impact on the environment.



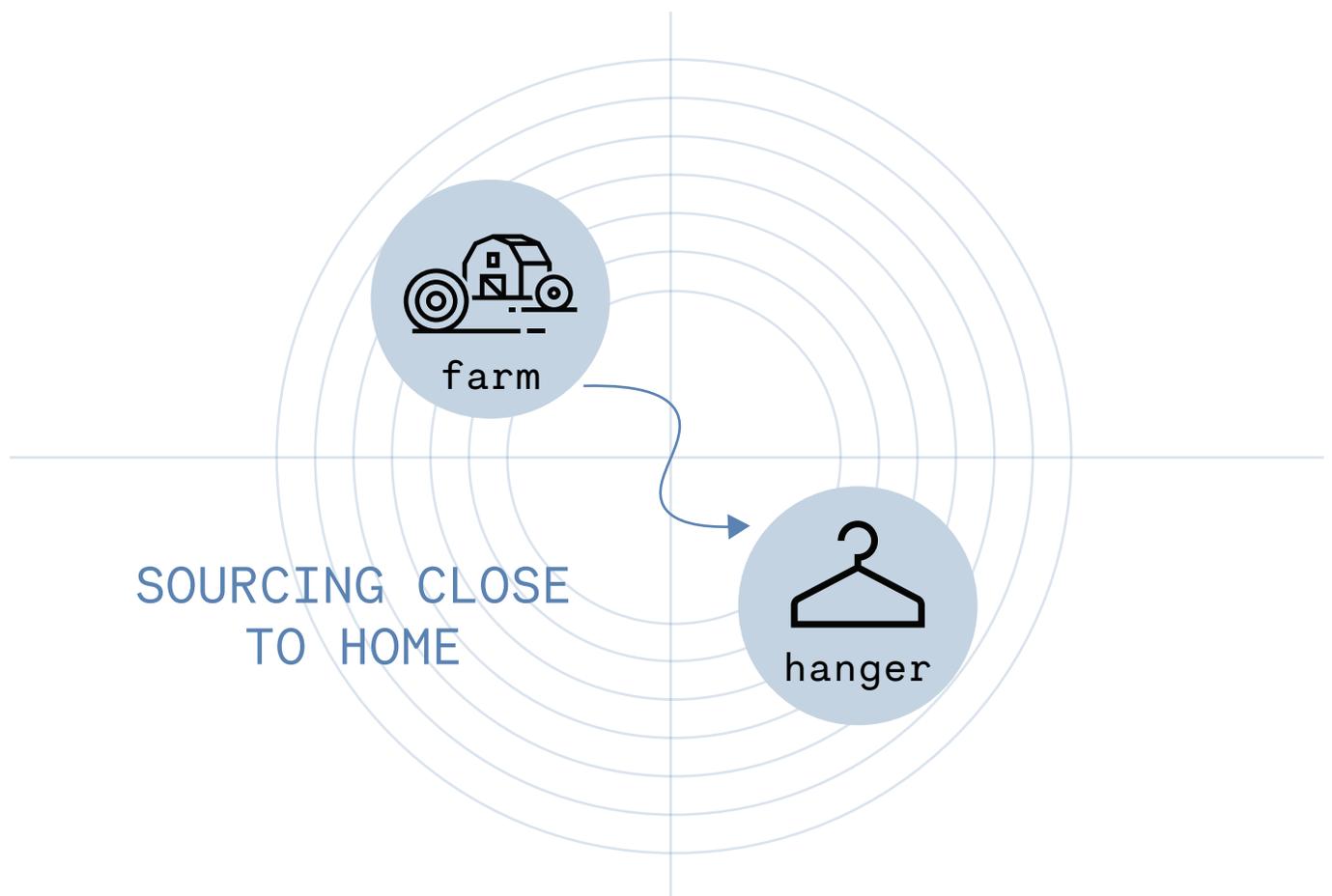
## Solutions

### → Direct to Farm & Nearshoring

Visiting the farms regularly is an essential enabler for transparency, and mills based in cotton-growing countries can benefit significantly from this advantage.

Direct-to-farm is also a way to ensure consistency in the cotton quality that mills are buying. A few mills have explained that sometimes, they have received bales that were not matching the requirement specifications they had ordered or bales contaminated with plastic bits from the plastic bags used to harvest the cotton. We also heard of cotton's origin not corresponding to the original mill's request, probably because of the latest cotton shortage troubles.

Working hand in hand with farmers can allow mills to anticipate and resolve quality issues and secure supplies.



Artistic Milliners, Bossa Denim, Candiani Denim, Interloop Ltd., and Soorty Enterprises are all working on Direct to Farm programs to ensure the wellbeing of farmers, gather impact data, and give their customers full trust behind their cotton claims.

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**Artistic<sup>®</sup>  
Milliners**

**Artistic Milliners** have started 2 programs in Pakistan, Milliner Cotton Initiative and Milliner Organic Cotton. Milliner Cotton Initiative includes 500 farmers over a land of 10000+ acres and Milliner Organic program has 1500+ farmers enrolled over an area of 9500 acres. Since Artistic Milliners can oversee the cotton shipments, they can conduct site visits and help broker deals between farmers and ginners. The Pakistan-based mill stated that having the team on site is essential to encourage transparency to the ginners and farmers.

**Bossa Denim** developed a QR code that presents the name of the farmer, farm, location, and variety ; however, some farmers have not permitted to share their name and in this case, receive the farm, location and cotton name. On top of this tracing technology, Bossa is working to have data on irrigation, carbon footprint, what ginning machines are used and electricity used. Stay tuned as Bossa will be able to produce traceable and measurable organic cotton in October this year.





**Candiani Denim** is working on direct-to-farm initiatives through their Blue Seed program for visibility and assurance that what they are receiving is what it is declared to be. They are partnering directly with growers in California and Spain to not only be able to trace their cotton supply back to the farm but back to the seed.

# Candiani

## DENIM

**Interloop Ltd.** has launched the Interloop Organic Kapas initiative, as well as Looptrace which focuses on traceable BCI cotton. The direct-to-farm programs have engaged 8000 farmers in the first year, in which they meet on a regular basis to understand the actual realities of the farmer. To ensure the program goals are met, they have partnered with the Lok Sanjh Foundation to showcase the farmer, production, sale, transportation, ginning process, bales, and transportation record to Interloop's facility.



**INTERLOOP**



**Soorty Enterprises** has developed the SOCI (Soorty Organic Cotton Initiative) program that was born out of the need to gather farm data, uplift communities and go beyond what certifications provide. This program covers 866 farmers, with the initial pilot goal of reaching 1200.

**SOORTY**  
DENIMKIND™

## → Farmer Centric Programs

"It's not just about knowing the farmer's name, it's about what you do with it. If you are not gonna support them {...} it doesn't make any sense." Sebla Onder, Sustainability Specialist at Orta

By reconnecting with the farmers, denim mills are enabled to get involved in their working conditions. Some of the most advanced traceability programs have allowed the birth of programs focused on working conditions on cotton fields.

Most cotton certifications missed out on the social aspects of farming, which led the brand Outland denim to partner with the mill Bossa to set up a farmer-centric program called [Sag Salim](#) (meaning "Safe and Sound" in Turkish). This pilot program focuses on farms in the Izmir area, where a large quantity of Bossa's cotton is cultivated. Audits are regularly conducted to ensure that working conditions on the fields are good, free from exploitation and that workers are paid regularly and adequately.

Through their [Milliner Cotton](#) program, Artistic Milliners are in touch with their farmers daily. They have invested in in-depth training for their farmers to go beyond the existing standards like BCI. On top of cotton growing programs, farmers also receive health and finance classes. Artistic Milliner found these programs mutually beneficial as they helped improve the quality of the cotton harvested and its price.

The [SOCl program](#) by Soorty has robust social engagement and besides providing their farmers with organic farming courses, they have set up health facilities for workers.

Interloop ambitions to extend its [Looptrace](#) and [Organic Kapas](#) programs and increase its social aspects. They hope to soon gather data on farmers' earnings, farm-workers' wages and working hours to ensure their conditions and environment are safe.

## → Tracing Technology

While direct-to-farm programs are ideal, tracing technology is particularly important when nearshoring is impossible or buying yarn from an external spinner. But, as traceability becomes more of a standard, more and more tracing technologies and companies are arising. So which one is right for you? It is challenging to find the right one depending on your problem areas, region and clients. But some mills interviewed have signed onto great partnerships, ranging from **physical tracers** and **DNA testing** to **blockchain technology**.

**Fibretrace** is a fast-growing company that embeds luminescent pigments into any fabric, right at the farm or spinning mill. The pigments can then be read and tracked at every stage of the supply chain - even by the end consumer. Each audit is recorded on the blockchain platform, ensuring immediate, secure, accessible and irrefutable data that builds a unique digital passport for each item, telling its story from farm to shelf. **Orta Anadolu** and **Pure Denim** are currently using Fibretrace technology, combining a physical trace with the blockchain. **Haelixa** is another company combining physical tracers with blockchain technology that **Soorty Enterprises** is using to trace their recycled cotton.

**Artistic Milliners'** traceability program is farmer centric with a push of data from farm to retail. Data is input in the system by the respective stakeholders (from the farmer to the ginner, the spinner and the weaver) using the **Retraced App** and stored on a blockchain. This technology enables them to trace back their supply chain all the way to raw materials.

Lastly, we have some mills using lab testing to confirm their cotton is from regions where it says it is grown. **Cone Denim** has partnered with Oritain, which tells us a products' origin fingerprint by measuring the natural concentrations of Trace Elements and Isotopes. Plants are creatures of their environment, and what they absorb from their surroundings has defining elements that allow us to see their '**origin fingerprint**'. If you take cotton from Brazil and compare it to cotton from India, it will look a lot different. On top of this, Oritain's third-party verification process ensures nobody can cheat the system. **AGI Denim** is also working on internal Testing initiatives.

## Going Further

### Once full traceability is achieved, what are the next steps?

We asked the mills what their dream goals were, and most of them mentioned regenerative agriculture. This practice focuses on the regeneration of soil, biodiversity, water cycles and carbon sequestration. It is considered an excellent solution for mitigating climate change and building resilient agriculture.

To measure the soil health of their farming partners, Artistic milliners have partnered with the Pakistani tech company Crop2X to collect a large scope of soil data (moisture, temperature, TDS, nitrogen, phosphorus, potassium...). Consequently, their farmers have increased their yield by 10-15%!

Via Fibertrace and their partner Good Earth Cotton, mills such as Bossa, Orta and Pure denim can also receive farm data and measure the carbon sequestration on the field.

Ebru Debbag, Executive director at Soorty, also told us about Sekem, a dreamy biodynamic farming project in Egypt. She was deeply inspired by how the Sekem initiative managed to revitalise desertic land and create a thriving agriculture program. She hopes that someday she can set up something similar in Pakistan.

Going even beyond the cotton plant, Candiani has invested in developing a patented hybrid seed named Blue Seed. This hybrid seed provides them with a tailor-made fibre that is extra-long and very robust, as well as less water and pesticide thirsty. Having traceability up to the seed level is also a way to ensure it is GMO-free and avoid potential organic certification frauds. They hope to continue developing more seeds in the future.

# the next step cotton merchants



The quest for a transparent cotton supply chain has led denim mills to reconnect with the farmers and set up direct-to-farm pilot programs. As these programs grow, the number of middlemen could be reduced and the role of cotton traders might transform.

In the next step of our research on [#WhoMadeMyCotton](#) we will consult cotton merchants to understand better their role in the cotton supply chain and how they picture a future of radical cotton traceability.

**#WhoMadeMyCotton**